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Identification in the Kindergarten of Factors That Make For Future Success in Reading and Identification and Diagnosis in the Kindergarten of Potential Reading Disability Cases. Final Report.

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In a 3-year longitudinal study, approximately 300 kindergarten children were selected for testing in the kindergarten and first and second grades to determine predictor variables of future success in reading and arithmetic. Results of the research tended to indicate that age and intelligence test scores were not good predictors of first and second grade reading achievement. It was concluded that the most significant predictors found were as follows: (1) the numbers subtest of the Metropolitan Readiness Test, (2) the Digit Span of the Wechsler Intelligence Scale for Children, (3) the Visual 3 and Complete-A-Man of the Gesell Development Test, (4) titles from the Minnesota Nonverbal Test of Creativity, (5) sex (for first grade reading success), (6) socioeconomic status (for second grade reading and arithmetic achievement), (7) education of the mother, (8) kindergarten teacher's prediction of the subject's reading ability, (9) kindergarten teacher's rating of the pupil's socioemotional growth, and (10) sociometric evaluation of "number of times child is seen in a positive role." Tabulated data and a bibliography with 79 references are appended. (JS)

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IDENTIFICATION IN THE KINDERGARTEN OF FACTORS THAT MAKE FOR FUTURE SUCCESS IN READING AND IDENTIFICATION AND DIAGNOSIS IN THE KINDERGARTEN OF POTENTIAL READING DISABILITY CASES

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SUMMARY

In this three-year longitudinal study, 300 kindergarten children were drawn from a population of beginning public school students to be tested in kindergarten, first, and second grade to determine predictor variables of future success in reading and arithmetic. Variables commonly associated with academic achievement, including psychological, socio-emotional, socioeconomic, readiness, physical, perceptual-motor, developmental, sociometric and creativity were measured.

Data were analyzed separately, using multiple regression analysis, for males and females and three socioeconomic levels, lower, middle, and upper. The study attempted to identify predictor variables of academic success for all children, not just of those who failed. Attention was directed only at the learner; school environment and teacher personality variables were not included in the analysis.

Results of the research tend to indicate that age and intelligence test scores are not good predictors of first and second grade reading achievement. Socioeconomic status is a significant predictor variable of second grade reading and arithmetic success, but not of reading and arithmetic success in the first grade. Sex was a significant predictor variable of first grade reading success; though comparable skills seemed to be tapped for the sexes, and in the same order, different measures were necessary to do this tapping. Teachers' predictions of future success in school were highly accurate, especially for those children of the lower socioeconomic group who failed. Only a simple statement of the teachers' expectations was necessary to predict academic success or failure; additional items and more complicated scales added no sensitivity to the instrument.

This research emphasized the previously reported high correlation between beginning reading scores and the Numbers subtest of the Metropolitan Readiness Test. The Numbers subtest alone appeared to more effectively measure skills needed in reading than did all the reading readiness subtests.

The Titles score of the Minnesota Creative Thinking Test was a significant predictor variable of male first grade reading success and of second grade arithmetic achievement.

The study tended to indicate that pattern analysis of the Wechsler Intelligence Scale for Children may not be a valid method of predicting future success in reading. A more global approach seems to be necessary.

Of the 300 children selected into the sample, 226 completed first grade tests, and 188 second grade measurements. Those who remained in the study at the end of the third year were not significantly different, at the .05 level, from children of the original sample of 300.

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INTRODUCTION

Past prediction studies in reading have been concerned primarily with identifying children who will fail. Such studies have focused on either high risk groups or on those assumed to be average. Though more research has been conducted in reading than in any other field of education, it is not known what specific factors associated with the kindergarten child relate to his future success in reading.

Statement of the Problem and Hypotheses

Can factors associated with the learner, which are related to future success or failure in reading, be identified in kindergarten? To fully utilize the assembled data, this same question was asked concerning future success in arithmetic. It was hypothesized that differences in achievement and prediction variables existed between sexes and among socioeconomic groups. This study was designed to test these hypotheses and to identify the predictor variables which are related to future success in reading and in arithmetic.

Scope of the Study

The 300 member kindergarten study population was not limited by exclusion of any group attending the nine neighborhood schools. Variables commonly associated with academic achievement were measured. Included were psychological, social-emotional, socioeconomic, readiness, physical skills, perceptual-motor, developmental, sociometric and creativity measures.

The data were analyzed separately for boys and girls and for the three socioeconomic groups. The statistical design used multiple regression analysis. The study identified predictor variables for all children, not only for those who would fail.

Attention was directed only to the learner. School and teacher environmental aspects were not studied. Approximately 112 students of the original 300 were systematically excluded from the study over the three year period because they moved, did not take all the tests or failed a grade. The period studied did not go beyond the end of second grade. Achievement test scores for reading and arithmetic constituted the criterion variables.

Review of Previous Studies

Chronological Age

Chronological age is traditionally used to predict academic achievement. This is demonstrated by the age requirements established by most school systems. In the fall of 1967, more than 70 percent of all U.S. states specified a chronological age cut-off date for school entrance (Miller and Norris, 1967, p. 54). Local administrative units were responsible for the other states.

Hall (1963), presents a review of studies by reading authorities which reveals that most writers believe that a child, to be successful in reading, must have attained a chronological age of approximately six years and a mental age of from six years four months to six years six months.

"Age alone does not seem to be a sound criterion for the school admission policy or prediction of success," Gabbard (1960, p. 228) declared after studying investigations of chronological age and academic achievement. She cites investigations on chronological age and school success which illustrate the lack of agreement at least on interpretation of meaning of results.

Andres (1965), found no significant correlations between chronological age and reading achievement at the end of first grade. Miller and Norris (1967, p. 54), state, "Results suggest that the tested readiness differences favoring the normal entrants tended to disappear by the end of grade two." Late entrants were found to have greater retention rates and to have more psychological referrals than the normal and early entrants. Standardized readiness, intelligence, and achievement scores, were not found to be significantly different at any grade level. "Additional findings in the present study cast considerable doubt on the notion that raising the entrance age requirement helps anyone."

Somwaru (1965-66), studied 24 kindergarten classes in the Toronto, Canada area through grade two. His conclusion was that age seemed to have very little, and sometimes even negative, relationship with ability to read.

Nicholson (1958), reported low correlations between chronological age and factors related to word background knowledge. She concluded that chronological age provided an insecure basis for first grade admission

Dykstra (1966), in a study of more than 700 first grade children, found chronological age to be unrelated to reading ability. Barrett (1965), reported negative correlations between chronological age and reading achievement of pupils in 26 first grade classes which he studied.

Mitchell (1962), reported that at the end of first grade there was a correlation of -.001 between reading achievement and chronological age of children 5 years 11 months through 7 years 11 months. For children 5 years 11 months through 6 years 11 months the correlation was .091.

Hayes and Nemeth (1964-65), in a first grade study of reading achievements, found correlations between their variables and age always under .14.

Silberberg and Iverson (1967), used multiple regression analysis to predict end of first grade reading schievement from readiness tests, IQ scores, and chronological age. Age was not one of the predictors.

Intelligence

Intelligence tests have been used as prediction measures since Binet. Correlations between IQ scores and achievement scores have been found to range from .34 in second grade to .85 in eighth grade.

Malquist (1958), states, "As a rule, the correlations between intelligence and reading ability, which have been reported, range from .40 to .60. This means that factors other than intelligence also play an important part in the development of reading ability."

The importance of IQ in prediction is now being questioned. De Hersch (1968), found that 11 kindergarten tests were better predictors than IQ of subsequent reading ability.

Cohen (1963b), concluded that something other than IQ was affecting first grade achievement on the Metropolitan Achievement Test since not much could be said about what an individual child would do in achievement by comparing his IQ with his Metropolitan Achievement Test.

Somwaru (1965-66), cites his own work and other studies to demonstrate low correlations between reading achievement tests and intelligence. He concludes that reading in grades one and two demands less exercise of intelligence than reading in higher grades.

Edwards and Kirby (1964), reported that an IQ score obtained in grade one accounted for only 25 percent of the variation in reading achievement scores in grade three.

Readiness Tests

Readiness tests designed to predict reading achievement are administered at the end of the kindergarten year or at the beginning of first grade.

Hillerick (1965), reported correlations of .40 in a variety of studies dealing with predictions of reading from the commonly used readiness tests.

Silberberg and others (1967), found that the Letters and Numbers subtest of the Gates Reading Readiness Test was nearly as efficient as all five subtests in predicting end of first grade reading scores. This test, administered in April, accounted for 26 percent of the male's variance and 34 percent of the female's variance in first grade reading achievement.

Mitchell (1962), reported that the Metropolitan Reading Readiness Test correlated .427 with the Metropolitan Reading Achievement Test at the end of the first grade for more than 900 pupils studied. The Numbers subtest of the Metropolitan Readiness Test correlated .512 with reading achievement scores.

Combinations of Variables

Castner (1935), describes a clinical method of selecting from among pre-school cases referred for study, those children most likely to be handicapped in learning to read. This method utilized the normal testing schedules of the clinic and dealt with 13 cases.

Cohen (1963a), used "observations of behavior, a team of teachers, psychologists and psychiatrists to predict which of 56 kindergarten children would have difficulty."

Nicholson (1958), made an extensive and precise inventory of certain visual, auditory, and kinesthetic abilities thought to be related to reading success in first grade.

Tauber (1966-67), studying 30 kindergarten children, found Dissimilar Words of the Auditory Discrimination Test and the Verbal Language Development Scale yielded a multiple rank correlation of .92 with achievement a year later.

Barrett (1965), studied chronological age, intelligence, and seven measures of visual discrimination by multiple regression analysis. Chronological age was found to be negatively related to first grade reading achievement. Intelligence did not predict for paragraph reading for males, females, or the total group. A multiple R of .66 was found for first grade reading.

Dykstra (1966), found that seven measures of auditory discrimination and an intelligence test accounted for 32 percent of the variation in first grade reading achievement.

De Hirsch (1968), determined a predictive index from 53 scores of kindergartners on 10 tests. The Predictive Index score was the number of tests each child scored at or above the critical score level.

Mayans (1966), computed multiple regression equations for three socioeconomic kindergarten groups on a battery of psychometric tests and first grade reading. She accounted for 22 to 42 percent of the variation in first grade reading.

Significance and Objectives of the Predictive Study

"Some subjects are more important than others. Reading is the most important of all," wrote John Gardner for the President's commission on National Goals. Recognition of the need to strengthen reading programs in the national interest and to assist the development of each individual is evident among educators and the general public.

Much research has concentrated on identifying, after the fact, causes of reading disability. More recently, predictive studies have attempted to identify potential disability cases. Much research has concentrated on the utilization of a narrow range of instruments and techniques or small experimental groups for short periods of time to predict or identify reading failures.

This study attempted to:

1. Predict reading success as well as failure.

2. Determine from past research and experience the most promising instruments for prediction of reading achievement.

3. Combine from each instrument the best predictive variables to compute a regression equation which would be both statistically and socially significant.

4. Follow the same subjects through three years of school pre-reading and learning-to-read experiences.

5. Use a representative sample so findings could be generalized to national populations of school children.

Significance of Study

This three-year study of 300 kindergarten students in the public schools of Cheyenne, Wyoming, tends to indicate that educational personnel and parents should question some of their basic assumptions concerning variables, such as IQ and chronological age, as valid predictors of academic success in primary school. Statistically significant zero order correlations may be of little, or no, practical value in planning children's educational programs. This appears to be especially true for children of lower socioeconomic groups.

This study also suggests that further consideration should be given to the skills that are tapped by readiness tests. The Numbers subtest appeared, in this research, to test skills needed for reading more completely than did the "reading" readiness subtests. A global, rather than a piecemeal, research approach appears to be necessary in studying primary reading predictor variables. Pattern analysis of the Weschsler Intelligence Scale is too narrow an approach.

Evidence presented in this study indicates that teachers' predictions of future success in school tend to be accurate, but the underlying reasons of this accuracy should be determined. On what basis do teachers make their predictions? Do the predictions relate to teachers' knowledge of the correlation between children's academic

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success and certain family variables? The ability of teachers to predict the achievement of children in low socioeconomic groups may be a function of these children fulfilling teacher and peer expectations.

Creativity scores also appear to be of little value in predicting primary achievement. Perhaps we are asking the wrong questions on these tests. The value of creativity may not assist primary reading and arithmetic achievement because of the manner in which reading and arithmetic are currently taught in our public schools.

Acknowledgements

The investigators offer their gratitude to Dr. E. Paul Torrance, formerly of the Bureau of Educational Research at the University of Minnesota, for permission to use his Nonverbal Form A of the Minnesota Test of Creative Thinking, and to Dr. Harold J. McGrady, Associate Professor of Language Pathology, Northwestern University, for his schema and comments on analysis of the data on sex differences.

They also thank Wyoming public school personnel, including George Bailey, Superintendent of Public Schools, Cheyenne; the Board of Trustees; Walter C. Reusser, former Deputy Superintendent of the Wyoming State Department of Public Instruction, now retired; Harry Roberts, Wyoming State Superintendent of Public Instruction; and especially the co-operating kindergarten teachers.

METHODS AND PROCEDURES

Three hundred kindergarten children from nine schools of Laramie County, Cheyenne, Wyoming, School District No. 1, were selected for this intensive three-year study. Schools were selected on the basis of socioeconomic district attendance areas.

Selection of Sample

Lower socioeconomic schools were selected on the same criteria by which they were chosen as disadvantaged schools for the Title One program of the Elementary and Secondary Education Act. The attendance area had the highest unemployment area of the district, more persons were welfare recipients, minority groups were concentrated in the area, and housing was substandard. Achievement and IQ scores in these schools were significantly below the average of the District as a whole.

TABLE I

AGE AND SEX GROUPING OF CHILDREN STUDIED

	60-64 MONTHS*	65-69 MONTHS	70-79 MONTHS	60-79 MONTHS
Males	49	56	48	153
Females	48	61	38	147
Total	97	117	86	300

*By Wyoming state statute a child must be five years old on or before September 15, before he can enroll in kindergarten.

The reverse of these conditions was true of the upper socioeconomic schools. Achievement and IQ scores were above the District mean. Middle socioeconomic schools were more like upper schools than lower socioeconomic schools on the criterion variables. All children in a kindergarten class of the selected schools were included. When additional children were needed, they were randomly selected from another kindergarten section in the same school. Seventy-five children from a lower socioeconomic area, 76 from an upper, and 149 from a middle socioeconomic area, were included in this study. The selected population showed class distinctions on the basis of education of the mother, education of the father, and occupation of the father, as indicated in Table II.

TABLE II

SOCIOECONOMIC GROUPING OF CHILDREN STUDIED

	Lower N = 75		Middle N = 149		Upper N = 76		Total N = 300	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Education of Mother*	10.37	2.16	12.34	1.20	12.95	1.86	12.02	2.22
Education of Father	10.29	2.13	12.83	2.42	12.75	3.01	12.46	2.81
Roe's Two-Way Classification of Father's Occupation**	4.8	.88	4.0	1.14	3.4	1.40	4.0	1.27

* Grade completed
** "1" professional to "6" unskilled

This size sample was initially drawn because District I has a mobile population. For the final evaluation at the end of second grade only, those pupils who had complete data on all prediction variables were retained in the study. At the end of first grade, 226 pupils remained in the study and at the end of second grade 202 remained. Fourteen children, however, had been retained in first grade. One hundred eighty-eight of the selected sample were in the second grade the third year of the study.

Statistical t-tests were computed to determine if the 98 pupils who were lost from the study were comparable to those remaining. The groups remaining in the study were comparable to the 98 lost. (See Table 1,Appendix A). The 14 retained in first grade, however, were not comparable to those dropped from the study nor to the 188 remaining in the study at the end of second grade. (See Table 2,Appendix A). This group must be considered separately from groupings made on sex or socioeconomic levels. Retention appears to reflect an overall deficiency covering a wide range of abilities and skills.

Selection of Measuring Instruments

Variables commonly used in predicting reading success include: (1) chronological age, (2) intelligence test scores, (3) readiness tests, (4) socioeconomic status and (5) sex. Combinations of other variables have used physical and emotional maturity, visual perceptual abilities, creativity, and stage of maturational development.

This study was undertaken to identify the variables kindergarten children bring with them to school that may predict reading achievement through second grade. If variables that are associated with successful learning to read experiences can be identified, the instructional programs can be structured to emphasize these areas. Children who fail to possess certain success attributes can be identified and assistance can be provided to them to overcome their deficiencies, or the learning program can be adapted to their specific strengths or weaknesses. This identification and adaptation can be done prior to failure, not after it.

Before this dream of educators can become a reality, the predictive success variables must be identified and measured. A logical procedure appears to be to start with the child as he enters the learning situation, to identify predictive variables of success, and then to modify the educational program and environment to best utilize the child's strengths. Presently, we have predictive clues, some based on research, but mostly based on what seems to be logical or common sense. Too often we accept that which seems logical rather than testing our hypotheses.

This study attempts to test these hypotheses. Measuring instruments were used which were designed to identify and make possible a determination of the relationships between possible predictive variables and reading and arithmetic achievement in the first and second grades.

Age

More than one hundred years ago, the first state compulsory attendance law was passed. Currently, not only are compulsory attendance laws in effect, but more than 70 percent of the states have eligibility age requirements. (Miller and Norris, 1967, p. 54).

This report deals only with the relationship between entrance age and academic success under present conditions without special provisions for varying entrance ages. First grade entrance age and reading success are assumed by many educators to be so interwoven that entrance age is often considered to be a predictor variable of academic success.

Hall (1963), presented a review of studies by reading authorities which revealed that most writers believe that a child, to be successful in reading, must have attained a chronological age of about six years and a mental age ranging from six years and four months to six years and six months.

Halliwell and Stein (1964), quote their own work, and others as well, to support their contention that pupils who enter school early are significantly poorer in achievement than are pupils who enter school later. Halliwell (1964), noted that in his investigation,sex and IQ of the early and late entrants were comparable. Though early entrants were statistically poorer in achievement than late entrants, the early entrants were still above their grade placement level. The reported

.01 significance level indicates that the difference between the two groups could have happened by chance only one time in 100. If grade equivalent differences had been reported, the social significance could have been considered. Was the statistical difference worth the possible loss of a year of productive life for children required to postpone school entrance?

Green and Simmons (1962, p. 45), make this critical evaluation in light of their own investigation, "In terms of achievement for years of schooling there would have been some advantage in waiting; in terms of achievement for years of life there would have been some disadvantage." Interestingly enough, the Green and Simmons study (1962), was one Halliwell and Stein (1964), quoted in support of their own findings.

Miller and Norris (1967), from a review of the literature and from state and local entrance age policies, summarized a trend toward an earlier admission age from 1918 to 1957. From 1958 to 1963 they found the trend reversed.

From their own investigation, Miller and Norris reported that though early entrants were significantly less ready than normal entrants on three of six readiness measures, these differences tended to disappear by the end of grade two. Late entrants, though of comparable IQ's, had greater retention rates and were rated by their classmates as significantly lower in adjustment, on each of nine sociometric dimensions, than early and normal entrants.

"Age alone does not seem to be a sound criterion for the school admission policy or prediction of success," Gabbard (1960, p. 228), declared after studying investigations of chronological age and academic achievement. Andres (1965), found no significant correlations between chronological age and reading achievement at the end of first grade. Somwaru (1965-66), studied 24 kindergarten classes in the Toronto area through grade two. The conclusion was that age seemed to have very little, and sometimes even negative, relationship with the ability to read. Nicholson (1958), reported low correlations between chronological age and factors related to word background knowledge. She concluded that chronological age provided a most insecure basis for first grade admission. Dykstra (1966), in a study of more than 700 first grade children, found chronological age to be unrelated to reading ability. Barrett (1965), reported negative correlations between chronological age and reading achievement of pupils in 26 first grade classes.

Hayes and Nameth (1964-65), in a first grade study of reading achievement, found correlations between reading and age to be under .14. Mitchell (1962), reported a correlation of -.001 at the end of first grade between reading achievement and chronological age for children 5 years 11 months through 7 years 11 months. For children 5 years 11 months through 6 years 11 months, the correlation was .091.

Silberberg, Iverson and Silberberg (1967), used multiple regression analysis to predict end of first grade reading achievement from readiness tests, IQ scores, and chronological age. Age did not survive as one of the predictors.

Social Class

Vilscek (1964), found significant differences in achievement on five first grade reading criterion variables between pupils from the lower socioeconomic level and upper socioeconomic level. Mayans (1966), concluded that grouping kindergarten children according to father's educational and occupational level is sound procedure for developing homogeneous groups in reading ability.

Cleveland (1966), summarized that children from upper socioeconomic homes bring to school a wealth of verbal ability, while children from lower socioeconomic homes require further development of verbal skills before beginning reading instruction. Worley and Story (1967), after statistical analysis, reported a difference of more than one year in language facility of higher socioeconomic status children than those of lower status. Deutsch (1965, p. 80), states, "In general, we have found that lower class children, Negro and white compared with middle class children, are subject to what we have labeled a 'cumulative deficit phenomenon', which takes place between the first and fifth grade years. Though there are significant socioeconomic and race differences seen in meausred variables at the first grade level, it is important to note that they become more marked as the child progresses through school."

Reid (1966), found insignificant relationships between Wechsler Intelligence Scale for Children (WISC) patterns and reading achievement and social class, though he did find the subtests, Arithmetic, Similarities, Digit Span, and Picture Completion, to be related to reading. Chandler (1966), reported an extensive survey of studies over the past 20 years on reading disability and socioeconomic status. This survey documented significant relationships between social status and intelligence test scores and between social status and reading achievement.

Fite and Schwartz (1965), identified more constitutional weaknesses among disadvantaged first grade children than among middle class children. Meyerson (1966, p. 3372-A), stated, "The major conclusion to be derived from the results is that factors associated with socioeconomic status apparently are more closely related to the reading readiness level of perceptually handicapped kindergarteners than either visual acuity or Kephart training."

Stodolsky and Lesser (1947), in a review of research, declared that lower performance of low socioeconomic and minority groups, compared with children of higher socioeconomic status, on intelligence tests, even at age four, has been unequivocally documented. They report that the cross-sectional Coleman study and the few longitudinal studies of achievement reflect the same pattern of low achievement for the disadvantaged, which worsens as the children progress through the grades.

Stodolsky and Lesser (1947), reported their study and a replication by Fort showing that social class affects level of ability, with middle class being superior to lower class, but does not alter the basic patterns of mental ability associated with ethnicity.

Hayes and Nemeth (1964-65), reported correlations of .32 between educational level of parents and end of first grade paragraph meaning scores of children. Robinson (1966), concluded that the reliability of measures of visual, auditory and visual-motor abilities, readiness, and intelligence were apparently influenced by the socioeconomic status of the children involved.

Intelligence Test

The Wechsler Intelligence Scale was administered to the entire sample during their kindergarten year 1965-66 (See Tables I, II, and III,Appendix C). Much research has been done using the WISC in studying pupils in all classifications, including those with reading problems. De Hirsch (1968), in studying potential reading difficulties at the five to six year old level, stated she found the WISC to be most satisfactory as an over-all measurement of the child's basic endowment.

Identifying Disabled Readers. Hirst (1964), reported her own work and a survey of investigations on patterning of WISC subtests for disabled readers. Substantial agreement was evident on the low scoring of poor readers on Information, Arithmetic and Coding. Most of the studies did not report on Digit Span, possibly because it is considered an alternate, and not a regular, subtest. High scores were reported for Block Design, Similarities and Comprehension. A common finding was the superiority of the Performance Scale over the Verbal Scale.

Sawyer (1965, p. 101), studied Wechsler profiles of 90 disabled readers ranging in age from 8 years through 15 years and 4 months. "The first six variables in descending order of influence were Arithmetic, Digit Span, Comprehension, Object Assembly, Picture Completion, and Vocabulary. When only the boys were considered, the order of influence, as determined by the size of the weight, was Digit Span, Arithmetic, Vocabulary, Picture Completion, Object Assembly, and Comprehension." She also found a decline in effectiveness in the ability of the subtests to discriminate as chronological age increased and a change in the contributions made by certain subtests as age increased.

Rabinovitch and others (1954), studied children with a suspected primary neurologic deficit and those with a secondary reading deficit whose poor reading was due to emotional or environmental problems. On primary cases, the discrepancy was the highest.

McLeod (1965, p. 220), analyzing subtest scoring for successful and non-successful readers at 12 1/2 years, reports, "While the Information and Arithmetic subtests correlated significantly with both Full Scale IQ and Verbal Scale IQ for each of the two groups, neither Digit Span nor Coding had a significant correlation with any IQ for either of the two groups."

Belmont and Birch (1966), compared WISC profiles of 150 retarded readers and 50 normal readers in Scotland. They found the retarded readers had significantly lower IQ levels than normal readers and performed better on the Performance Scale than the Verbal Scale.

Shepherd (1967), found that adequate readers were significantly superior to inadequate readers on a test of digit repetition (comparable to WISC Digit Span).

Kindergarten and Primary Studies. Ames and Walker (1964, p. 313), tested 54 kindergartens with the WISC and the Rorschach and compared the scores with fifth grade reading scores. These children were above average in both intelligence and socioeconomic rating. They reported, "The slight relationship of the perceptual and cognitive aspects of maturing to those reflected in an IQ score was unexpected. Indeed, they are much more closely related to a reading test given some five years later than to an intelligence test given in the same semester." They continued that the findings, "offer support for the suggestion that individual subject characteristics other than either general intelligence or specific reading skills contribute to individual differences in reading at the above average level as well as below average."

Darley and Winitz (1961), tested 150 physically normal and above 70 IQ pre-kindergarteners to determine if sex test differences exist at that age. "Satitstically significant differences favoring girls were found on the Performance Scale and on Similarities and Coding Subtests."

Poor readers have been found to be deficient on the Digit Span and Arithmetic WISC subtests. (Sawyer, 1965; Belmont and Birch, 1966; and Sheperd, 1967.) Belmont and Brich (1966), found retarded readers were made up of two groups: One group was low in reading, and in the other group low reading was only another aspect of generally low competence. This study was made on a regular school population and not on those referred to a special clinic or program. They were Scottish children.

Irwin (1966), cautions against the use of WISC pattern analysis, particularly at younger age levels, because of the lower reliability of subtest scores. The IQ predictive value is challenged by Kirby and Edwards (1964), who found correlations between first grade IQ scores and third grade reading scores to be .464. This correlation accounts for less than 22 percent of the variation in reading scores. Perhaps too much time has been spent on that 22 percent and not enough time on the variables accounting for the other 78 percent.

Pattern Analysis of the WISC

Pattern analysis of the WISC has been a research topic for at least 15 years (Hirst, 1964). Irwin (1966), questions the use of pattern analysis on the basis of low reliability of the subtests, particularly at the 6 year level. He found reliability higher at age 11 years, but there still was a large error component. The differences between the Verbal and Performance Scales were more reliable than the differences among the subtests.

Readiness Test

Metropolitan Readiness Tests are used in the regular testing program of the Laramie County District I schools at the end of the kindergarten year. Results of these tests were used for the sample selected.

The Metropolitan Readiness Test is commonly used to assess readimess for academic work or to predict reading and arithmetic success. (Ewing, 1966; Mayans, 1966).

Mitchell (1962), tested 1170 first grade pupils with the Metropolitan Readiness Test in September and with the Metropolitan Achievement tests in May. The correlations ranged from .51 to .63. Mitchell reported a mean Metropolitan Readiness percentile score for males of 58 and for females of 64.

Lovell, Gray and Oliver (1964), found that: (1) marked reading failure was nearly twice as frequent among British males as among females, even at 14 to 15 years of age, (2) the mean reading score of the males was lower than that for the females and (3) the WISC Vocabulary Score of the males was not below that of the females. Wozencraft's (1967), study indicates that sex differences in reading tend to disappear as children become older and that for any age the differences between high learning ability males and females are less than the differences between average and slow learning males and females.

Chall and Feldmann (1966), collected data on 45 measures of pupils' first grade reading skills and 83 measures of teacher characteristics and reading practices. Only four of the 45 measures of pupil skills showed significant sex differences, and these favored the females. Weintroub (1966, p. 157), surveyed research on sex differences in reading achievement. He stated, "While some evidence collected at the end of first grade shows that there are few or no sex differences in reading achievement, there is a preponderance of data indicating that girls attain better scores than boys on reaching achievement tests,...beyond the first grade the evidence is somewhat similar in that, as a rule, girls maintain their superiority in reading achievement at least through the elementary grades."

Bentzen (1963), reports, "It has been established that the human male organism matures at a slower rate than the female for the same chronological age, and that learning and behavior disorders occur three to ten times more frequently among boys than girls."

Davis (1966), found: (1) no significant sex differences between first grade males and females, (2) no first grade teacher discrimination against males. Sapir (1966), found significant perceptual motor differences in 4 year old males and females that persisted at the 5 year level. Nicholson (1958), found females to be superior to males in all of his tests of background abilities related to reading success in first grade. The differences were statistically significant in all but four subtests. Andres (1965), found significant sex differences favoring females in first grade reading achievement.

Mitchell (1962, p. 767), also found the Numbers Readiness subtest had a correlation of .512 with first grade reading. The total readiness tests one to four had a correlation of .427. The total tests had a correlation of .511. He used 919 white children in a county system. The same results were reported for a second group of Negro children.

Teacher Rating of Pupil Progress in Reading

A scale rating six aspects of pupil reading readiness was designed by District personnel. (See Table V, Appendix B).

Ewing (1966), compared kindergarten teacher ratings made in October with Metropolitan readiness scores obtained the following spring. Readiness scores were marked on a five-point scale as were teacher ratings. Teachers were able to correctly predict the scoring of their pupils in a little more than 40 per cent of the cases.

Ilg and Ames (1965, p. 328), reported, "In our studies we have often been amazed to note how closely our developmental findings coincide with the teacher's judgment, especially at the kindergarten level." Anderson and others (1967), reported that elementary teachers ranked mental age, background of experience, and emotional adjustment, high in importance in learning to read. Mattick (1963), in a correlation study of predictions of reading success, found that the kindergarten teachers' predictions of reading success in first grade were correlated .546 with the Metropolitan Readiness test. Mayans (1966), found a correlation of .47 for the kindergarten teachers' rating and the first grade Gates Reading Test. She found a correlation of .538 with the kindergarten teachers' rating and the Metropolitan Readiness Test.

Rosenthal (1968), reported that in a lower socioeconomic school, teachers were told test data indicated certain children would "bloom" intellectually. Though the children were randomly selected, the "blooming" occurred. In this instance, teachers were not asked to predict, but were told what to expect and it happened.

Morgan (1960), reported kindergarten teachers given special inservice training were able to differentiate potentially low from average and high first grade achievers. There was no significant difference between test score and kindergarten teacher predictions of potential achievement within each group.

Henig (1949), found teachers at the start of the first grade could predict reading success as well as could the Lee-Clark Reading Readiness Test. Kermoian (1962), found that the subjective judgment of teachers of first grade reading success of children was as valid as results obtained by tests. Wolaver (1963), found that kindergarten teachers had an unusually high degree of accuracy in predicting pupils' academic success.

Social-Emotional Maturity Rating Scale

A scale rating kindergarten pupils by teachers on social-emotional maturity was designed by District personnel. (See Table IV, Appendix B). The form rates pupils on ten aspects of social-emotional growth. Included in this study was a total score and a popularity rating.

Kindergarten Registration Form

A registration form, designed by District personnel, provided background information on the family and early childhood experiences of the kindergarteners. (See Table II, Appendix B).

Sociometric Form

A sociometric instrument designed by District personnel (See Table I, Appendix B) was used to measure interpersonal relationships of the selected sample.

Muma (1965), found high peer acceptance related to high academic performance for secondary pupils. Kwall, et al. (1967), found a multiple correlation of .753 with (1) teacher's rating of industry, (2) sociometric leadership, and (3) education of mother with fifth grade achievement. Henderson et al. (1965), in studying self-social-concepts in relation to reading grades 1 to 12, concluded that high readers are more socially oriented than poorer readers.

Wattenberg and Clifford (1964), found that measurements of self-concept taken in kindergarten proved significantly predictive of progress in reading, but not significantly related to mental test scores.

Creativity Test

The Non-Verbal Form A Minnesota Tests of Creative Thinking by E. Paul Torrance (experimental form) was used with special permission of the author. (See Table III, Appendix B). Raw scores for Fluency, Flexibility, Originality (Figures), Originality (Titles), and Elaboration for Tasks 1, 2, 3, and total scores were computed.

The relationship between creativity and academic success has been studied at intermediate grade levels with conflicting results. Little if any research has been undertaken to determine the ability of creativity measured in the kindergarten to predict success in reading at the first and second grade levels.

Getzels and Jackson (1962), in a study of creativity and giftedness in adolescence, found correlations equal to, or higher, between creativity and achievement than between IQ and achievement. The report concluded that, as seen by the teacher, an achieving adolescent's desirability is a function of his high IQ, not only of his high achievement. Highly creative pupils who achieved above their IQ expectancy levels were not seen to be as desirable to their teachers as the high IQ pupils.

Harootunian (1966), studied 15 predictor tests for seventh and eighth grade reading achievement and noted that intelligence was not the dominant variable, but "Missing Facts" was. Missing Facts measures sensitivity to problems and conceptual foresight, which is considered to be a test of creativity, Harootunian (1966) noted.

Berg and Rentel (1967), reviewed the literature relating creativity to intelligence and reported correlations ranged from .16 to .32. Intelligence and creativity each account for about the same variation in reading achievement, their review suggested.

In opposition to the conclusions drawn by these researchers, Cicirelli (1965, p. 308), after investigating the relationships among creativity, IQ and academic achievement at the sixth grade level, concluded, "...the relationship of creativity and achievement was a weak one...the effect of such factors as family structure, cultural environment, and teaching methods upon creativity and achievement, might profitably be investigated..."

Developmental Examination

The Developmental Examination described in School Readiness Behavior Tests Used at the Gesell Institute by Frances L. Ilg, and Louise Bates Ames, of the Gesell Institute of Child Development, (1965), was used. This examination provides 14 scores on a variety of development areas.

Ilg and Ames (1965), found 34.5 percent to 59 percent of the children studied were ready for grade placement, as defined by their instrument. None was indicated to be above their grade placement. For the total group, the authors found the highest mean IQ in the ready groups and the lowest IQ in the unready. The kindergarten-ready pupils had a two-month older mean age than did the unready group. In first grade, the ready group had an eight month younger mean age than did the unready group. The authors give no explanation for this development, nor for their second grade age findings.

In second grade, the ready group had a six month younger mean age than did the unready group. The percentage of teachers' ratings at the end of the year equalling the developmental examination at the beginning of the year, was 83 percent for kindergarten, 68 percent for first grade and 59 percent for second grade.

Zike (1968), reported two studies using the Gesell Developmental Tests which indicated that 40 percent of all children begin formal schooling before they are ready physically or emotionally.

Physical Skills Evaluation

A physical skills examination adapted for six year olds was designed by District personnel. Raw scores were obtained on five subtests. (See Table VI, Appendix B).

Smith (1968), reports on a number of studies indicating that the slow learner tends to perform poorly on both scholastic achievement tests and motor ability tests. Smith also states that gross motor ability is an integral part of a child's education, which leads to greater success than do increments in strength, endurance, and flexibility.

Karlan (1957), investigated the relationships of physical growth and success in undertaking beginning reading. His analysis indicated that skeletal growth, height, and weight were not related to reading readiness test scores.

Cook and Blood (1964), reported an "unduly high incidence of prematurity, measles with complicating conditions, and malpresentation at birth among those with reading disabilities."

Psycholinguistic Abilities

The Illinois Test of Psycholinguistic Abilities by Samuel A. Kirk, and James J. McCarthy (experimental form) was administered to a sample of 50 of the study population.

Visual Perception

The Developmental Test of Visual Perception by Marianne Frostig, was administered to a sample of 50 of the study population. (See Table I, Appendix D).

Achievement Tests

The Metropolitan Achievement Tests, Primary I and Primary II, were administered at the end of the first and second grades as part of the District testing program. Raw, percentile rank, and grade placement scores were used for Word Knowledge, Word Discrimination, Reading, and Arithmetic Subtests for individuals of the study sample.

Data Analysis and Statistical Treatments

To more precisely determine the nature of the relationships among the predictor variables and the criterion variables, data were first analyzed using only the variables from each of the instruments to predict first grade achievement. The second step consisted of combining all variables, which were found to be related to the criterion variable, to develop an overall regression equation. In both the initial analysis and final analysis a stepwise regression procedure was used to systematically add to the regression the next variable which would account for the largest proportion of the remaining unexplained variance in the criterion variable. The unique contribution of the variable added was tested at each step as part of the analysis available with the BMDO2R Stepwise Regression program.

The initial analysis included computing regression equations and studying the relationships between the independent and criterion variables for (1) the total group, (2) males and females and (3) the three socioeconomic groups. Any predictor variable which was statistically significant at the .05 level or higher, in any of the three groups, was included in the second step of the data analysis. Regression equations were then computed for the total group, males and females and socioeconomic groups, to select from the total list of variables those which contributed significantly to the overall regression, when used in combination with variables from several of the instruments.

The following variables were combined in analyzing the overall regression scheme for first and second grade reading:

> 1. From the WISC: (a) Information, (b) Arithmetic, (c) Digit Span, (d) Block Design, (e) Verbal IQ, (f) Performance IQ, and (g) Full Scale IQ; 2. From the Minnesota Test of Creativity: (a) Originality (Titles); 3. Information from School Record: (a) Age, (b) Educational level of Mother, (c) Sex, and (d) Socioeconomic Status; 4. From the Social-Emotional Maturity Rating Scale: (a) Other children seem to feel toward him, (b) Has leadership qualities, (c) Needs teacher control, (d) Social-Emotional growth; 5. From the Metropolitan Readiness Test: (a) Information, (b) Matching, (c) Numbers, and (d) Draw-A-Man; 6. From the Teachers' Estimate of Pupil Progress in Reading: (a) Prediction of second grade reading success; 7. From the Sociometric Form: (a) Seen by others in positive role; 8. From the Developmental Examination: (a) Numbers, (b) Complete-A-Man, (c) Single and Double Commands and (d) Visual 3; and 9. From the Physical Skills Test: (a) Bend, Touch, and Twist.

These variables were combined to compute regression equations for first and second grade arithmetic with the following exceptions:

> 1. Activities and Total Task I were added from the Minnesota Test of Creativity; 2. "Shows leadership qualities" was the only one of the four variables retained from the Social-Emotional Maturity Rating Scale;

and 3. "Seen by others in positive role" was deleted from the Sociometric form and "Times Chosen" was added.

The final regression schemes included only those variables which contributed significantly, at the .05 level or higher, to the prediction of first and second grade achievement test scores in reading and arithmetic. (See Tables III and IV, Appendix A). Regression schemes are reported here only for those groups in which the regression equations were significantly different, based on statistical tests.

FINDINGS AND DISCUSSION

Of the 300 children drawn from the population of kindergarten pupils in the Cheyenne, Wyoming Public School District I, 226 children completed the first grade and 188 children completed second grade at the end of the third year of study. This group of 188 children was not significantly different, at the .05 level, on variables measured in the original sample of 300 respondents, as demonstrated in Table I. The lower socioeconomic group followed the pattern determined in previous research. They began their school experience below the mean of the middle and upper socioeconomic children on variables associated with academic success.

TABLE I

COMPARISON OF WISC MEAN IQ OF ORIGINAL SAMPLE VERSUS SAMPLE AT END OF STUDY

	Original Group N = 300		Group Remaining at end of Grade 1 N = 226		Group Remaining at end of Grade 2 N = 188	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Full Scale IQ	104.4	14.2	104.7	14.2	105.5	15.2
Verbal IQ	102.7	14.8	102.9	14.7	103.7	15.6
Performance IQ	105.5	14.1	105.7	14.4	106.4	15.7

Statistical tests of mean scores reported in Table I showed no significant difference, at the .05 level or higher, between those children who were dropped from the study at the end of kindergarten and grade one, and those who remained in the sample at the end of the second grade.

Findings From The WISC

No significant difference was found between the sexes in any of the Wechsler Intelligence Scale scores, though the females in the sample demonstrated greater variability, as shown in Table II. The sample was within the average range since the mean deviation IQ has been established at 100 with a standard deviation of 15 IQ points.

TABLE II

COMPARISON OF WISC MEAN IQ FOR MALE AND FEMALE SUBJECTS VERSUS TOTAL SAMPLE

	TOTAL GROUP N = 300		SEX			
			MALE N = 153		FEMALE N = 147	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Full Scale IQ	104.4	14.2	104.8	12.9	104.1	15.5
Verbal IQ	102.7	14.8	102.9	13.5	102.5	16.1
Performance IQ	105.5	14.1	105.9	13.4	105.1	14.8
Age in months	71.4	4.0	71.4	3.8	71.4	4.1

The lower socioeconomic group of children scored lower on all WISC IQ scores and were older than the middle or upper socioeconomic children, as demonstrated in Table III.

TABLE III

COMPARISON OF WISC MEAN IQ SCORES OF LOWER, MIDDLE AND UPPER SOCIOECONOMIC CHILDREN

	SOCIOECONOMIC GROUP					
	LOWER N = 75		MIDDLE N = 149		UPPER N = 76	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Full Scale IQ	97.0	14.6	107.2	14.1	106.3	11.5
Verbal IQ	96.0	14.2	105.0	14.7	104.9	13.7
Performance IQ	98.7	14.7	108.3	14.3	106.6	10.9
Age in months	72.8	4.7	70.9	3.7	71.1	3.4

There appeared to be a tendency for the youngest age group of children in the sample to have higher IQ scores. By Wyoming state statute, a child must attain a minimum age of 60 months on or before September 15, of the current school year, to enroll in public school kindergarten. Table IV shows a comparison of age groups in the sample.

TABLE IV

COMPARISON OF WISC MEAN IQ SCORES FOR THREE AGE GROUPS IN SAMPLE

	AGE LEVELS (IN MONTHS)					
	60-64 N = 97		65-69 N = 117		70-79 N = 86	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Full Scale IQ	105.4	14.8	104.5	14.0	103.3	14.0
Verbal IQ	103.4	15.2	102.6	13.9	102.0	15.7
Performance IQ	106.2	14.8	105.8	14.6	104.3	12.6

Zero order correlations between mean WISC IQ scores and first grade reading and arithmetic achievement scores were within the range typically reported in the research literature. The highest zero order correlation for first grade reading and a WISC IQ score was .514 for male reading and Full Scale IQ. The variation accounted for in the reading score, however, was only 26 percent. One subtest, Digit Span, accounted for slightly more variation in reading for the upper socioeconomic children, as demonstrated in Table V.

TABLE V

ZERO ORDER CORRELATIONS BETWEEN SELECTED WISC SUBTEST SCORES AND TOTAL SCORES AND FIRST GRADE READING ACHIEVEMENT

WISC SUBTESTS	TOTAL GROUP N = 226	SEX		SOCIOECONOMIC GROUPS		
		MALE N = 114	FEMALE N = 112	LOWER N = 55	MIDDLE N = 111	UPPER N = 60
Information	.309*	.304*	.358*	.289*	.320*	.253*
Arithmetic	.417*	.419*	.368*	.395*	.400*	.402*
Digit Span	.517*	.481*	.496*	.433*	.452*	.569*
Block Design	.330*	.358*	.344*	.384*	.183*	.452*
Full Scale IQ	.445*	.514*	.486*	.441*	.442*	.462*
Verbal IQ	.412*	.419*	.463*	.430*	.393*	.375*
Performance IQ	.374*	.484*	.400*	.353*	.592*	.437*

*Significant at or above the .05 level.

For first grade arithmetic achievement, the Full Scale IQ score accounted for 29 percent of the variation in the achievement scores, as shown in Table VI.

TABLE VI

ZERO ORDER CORRELATIONS BETWEEN SELECTED WISC SUBTEST AND TOTAL SCORES AND FIRST GRADE ARITHMETIC ACHIEVEMENT

WISC SUBTESTS	TOTAL GROUP N = 226	SEX		SOCIOECONOMIC GROUPS		
		MALE N = 114	FEMALE N = 112	LOWER N = 55	MIDDLE N = 111	UPPER N = 60
Information	.331*	.350*	.326*	.296*	.382*	.266*
Arithmetic	.442*	.459*	.388*	.297*	.512*	.407*
Digit Span	.383*	.391*	.334*	.234*	.394*	.462*
Block Design	.375*	.396*	.361*	.420*	.307*	.437*
Full Scale IQ	.509*	.537*	.511*	.444*	.542*	.492*
Verbal IQ	.450*	.484*	.435*	.388*	.483*	.410*
Performance IQ	.452*	.457*	.479*	.395*	.470*	.462*

*Significant at or above the .05 level.

At the second grade level, 23 percent of the variation in the upper socioeconomic group reading scores was accounted for by the Full Scale IQ scores. Digit Span accounted for slightly more variation in reading for the upper socioeconomic group of children than for all other socioeconomic groups, as shown in Table VII.

TABLE VII

ZERO ORDER CORRELATIONS BETWEEN SELECTED WISC SUBTEST AND TOTAL SCORES AND SECOND GRADE READING ACHIEVEMENT

WISC SUBTESTS	TOTAL GROUP N = 188	SEX		SOCIOECONOMIC GROUPS		
		MALE N = 91	FEMALE N = 97	LOWER N = 43	MIDDLE N = 90	UPPER N = 55
Information	.166*	.138	.244*	.148	.161	.191
Arithmetic	.271*	.179	.359*	.301*	.180	.360*
Digit Span	.378*	.299*	.387*	.085	.296*	.533*
Block Design	.274*	.264*	.280*	.266	.073	.333*

TABLE VII (Cont.)

WISC SUBTESTS	TOTAL GROUP N = 188	SEX		SOCIOECONOMIC GROUPS		
		MALE N = 91	FEMALE N = 97	LOWER N = 43	MIDDLE N = 90	UPPER N = 55
Full Scale IQ	.409*	.324*	.421*	.213	.188	.480*
Verbal IQ	.370*	.240*	.402*	.218	.153	.434*
Performance IQ	.372*	.318*	.344*	.158	.179	.375*

*Significant at or above the .05 level.

For second grade reading, the Performance IQ score accounted for 27 percent of the variation in upper socioeconomic arithmetic scores. Block Design accounted for slightly more variation for the same group in arithmetic, as can be seen in Table VIII.

TABLE VIII

ZERO ORDER CORRELATIONS BETWEEN SELECTED WISC
SUBTEST AND TOTAL SCORES AND SECOND GRADE
ARITHMETIC ACHIEVEMENT

WISC SUBTESTS	TOTAL GROUP N = 188	SEX		SOCIOECONOMIC GROUPS		
		MALE N = 91	FEMALE N = 97	LOWER N = 43	MIDDLE N = 90	UPPER N = 55
Information	.096	.174	.164	.083	.170	.219
Arithmetic	.345*	.498*	.299*	.353*	.326*	.511*
Digit Span	.310*	.320*	.360*	.204	.246*	.435*
Block Design	.294*	.326*	.303*	.212	.180	.534*
Full Scale IQ	.468*	.397*	.425*	.311*	.321*	.517*
Verbal IQ	.437*	.353*	.374*	.328*	.290*	.389*
Performance IQ	.420*	.324*	.376*	.203	.274*	.520*

*Significant at or above the .05 level.

From the multiple correlations reported in Table IX, it appears that subtests (1) Digit Span, (2) Arithmetic, (3) Information, and (4) Block Design, are the most powerful subtests for predicting primary reading and arithmetic achievement. Therefore, these subtest scores were included, with the Full Scale, Verbal, and Performance IQ scores, in the combined variable regression equation.

The interaction of the Verbal and Performance Scales was used as a predictor variable. A review of research literature on the subject suggests that few researchers have been interested in testing interaction effects. A common assumption among reading specialists is that the Verbal IQ score is the best predictor of a child's ability to read. The interaction effect of the Verbal and Performance Scales did not increase the ability to predict reading success.

TABLE IX

MULTIPLE CORRELATIONS BETWEEN WISC SUBTESTS AND FIRST GRADE ACHIEVEMENT SCORES
(Significant at .05 or Higher)

READING ACHIEVEMENT			ARITHMETIC ACHIEVEMENT		
TOTAL GROUP					
Variable	Multiple R	R^2	Variable	Multiple R	R^2
Digit Span	.49	.24	Arithmetic	.45	.20
Arithmetic	.54	.29	Block Design	.49	.24
			Information	.52	.27
MALE					
Digit Span	.45	.20	Arithmetic	.44	.19
Arithmetic	.53	.28	Information	.52	.27
Maze	.55	.31	Maze	.55	.30
FEMALE					
Digit Span	.49	.24	Arithmetic	.45	.20
Block Design	.53	.28	Object Assemble	.51	.26
LOWER SOCIOECONOMIC GROUP					
Information	.39	.15	Information	.39	.15
Digit Span	.49	.24	Object Assemble	.49	.24
MIDDLE SOCIOECONOMIC GROUP					
Digit Span	.40	.16	Arithmetic	.45	.20
Arithmetic	.48	.23	Picture Completion	.50	.25
			Block Design	.53	.28
UPPER SOCIOECONOMIC GROUP					
Digit Span	.54	.30	Digit Span	.51	.26
Block Design	.59	.34	Block Design	.59	.34

Pattern Analysis on the WISC

The importance of IQ scores in predicting academic achievement from kindergarten through second grade has not been confirmed by this study. Much research has been based upon the assumption, expressed or implied, that mental test performance is the best predictor of reading achievement. Documentation of this assumption is difficult to find in the literature; however, IQ tests are administered in the belief that they have practical value for the teacher.

The common finding that poorer readers have a higher Performance than Verbal IQ may not be a finding reserved only for poorer readers. More than half of the kindergarten pupils tested in this study were found to be 11.5 IQ points higher in Performance than in Verbal IQ, as is shown in Table X.

TABLE X

COMPARISON OF DIFFERENCES IN WISC VERBAL AND PERFORMANCE IQ SCORES BY TOTAL GROUP, SEX, AND SOCIOECONOMIC LEVELS

	Mean	S.D.	N.
Total Group			
Plus Difference Verbal Minus Perf.	9.85	7.608	123
Minus Difference Verbal Minus Perf.	11.50	7.850	177
Males			
Plus Difference Verbal Minus Perf.	10.13	7.712	60
Minus Difference Verbal Minus Perf.	11.25	7.323	93
Females			
Plus Difference Verbal Minus Perf.	9.58	7.560	63
Minus Difference Verbal Minus Perf.	11.77	8.430	84
Lower Socioeconomic Group			
Plus Difference Verbal Minus Perf.	8.31	7.122	29
Minus Difference Verbal Minus Perf.	9.95	7.545	46
Middle Socioeconomic Group			
Plus Difference Verbal Minus Perf.	9.79	7.268	62
Minus Difference Verbal Minus Perf.	13.02	8.391	84
Upper Socioeconomic Group			
Plus Difference Verbal Minus Perf.	11.37	8.568	32
Minus Difference Verbal Minus Perf.	10.29	6.701	47

It appears, therefore, that it may not be unusual to find Performance scores higher than Verbal. This is especially true if the difference between the Verbal and Performance scores has greater reliability than differences among the subtests.

In the regression equation formed from all the data, no IQ score proved to be a significant variable for predicting first or second grade reading achievement for any socioeconomic groups.

Digit Span was the only WISC subtest to emerge as a significant predictor variable of first grade reading; it was a predictor first grade reading variable for the total group. Digit Span was a significant predictor variable of the upper socioeconomic group in second grade reading achievement.

For arithmetic, WISC Performance IQ was a significant first grade predictor variable for the total group. The Full IQ score was a significant second grade arithmetic predictor variable for the total group. Information and Block Design WISC subtests were significant arithmetic predictor variables for the total and second grade group. For the second grade upper socioeconomic group, Block Design and Arithmetic subtests were significant arithmetic achievement predictor variables.

Summary of WISC Findings

The findings of the present study are similar to those found in the literature, though this study sampled a larger number of respondents, was a three-year longitudinal study, and the analysis utilized stepwise, multiple regression equations. These factors permitted the investigators to do a more complete analysis of the hypotheses than has been commonly possible.

From this study, and the research of others, it appears:

1. The amount of reading achievement variation accounted for by IQ scores is not sufficient to consider IQ scores a determining factor of first or second grade reading success.

2. The two subtests which emerged as significant reading predictors were not strong enough, nor adequate enough in number, to determine any pattern.

3. The common finding of the superiority of the Performance Scale over the Verbal IQ Scale questions the assumption that this superiority is associated only with poor readers.

4. Predictors for first and second grade academic success cover a much broader area than do any intelligence tests.

Findings From Kindergarten Registration Form

At the initial registration of pupils in kindergarten, the registration form shown in Table II, Appendix B, was completed by the adult registering the child. School personnel assisted each parent as required. Language spoken in the home was not considered in the analysis since 284 registration forms listed "English" as spoken in the homes.

Family constellation also was not analyzed since 271 parents reported the home had both a mother and father, 13 had mother and stepfather, one had stepmother and father, and 12 had mother only; two refused to answer. The occupation of the mother was not considered since 237 of the 300 respondents indicated they were housewives. The registration report results on father's occupation are shown in Table XI.

TABLE XI

ROE'S CLASSIFICATION OF FATHER'S OCCUPATION

		Lower	Middle	Upper	Total
1*		0	2	6	8
2		0	18	15	33
3		5	18	19	42
4		17	53	17	87
5		22	43	9	74
6		15	9	6	30
	N =	59	143	72	274
	$\overline{X}$ =	4.8	4.0	3.4	4.0

*(1 Professional to 6 Unskilled)

The lower socioeconomic group had more siblings than either of the other two groups. Only nine of the 300 indicated there was any one else in the home other than the immediate family, so this factor was not considered in the analysis. Also, no pupil was listed as having restirictions on participation in school activities.

Only one pupil was listed as having serious illness and four as having more than the usual amount of illness. Summer 1965 program activities included: recreational school sponsored,11; recreational church sponsored, 74; and Project Head Start, 17. These were not analyzed.

The lower socioeconomic group had lower aspirations for their

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[1] Roe, Helen, The Psychology of Occupations, John Wiley and Sons, New York, 1956.

child's educational plans, as demonstrated in Table XII.

TABLE XII

PARENTS' EDUCATIONAL PLANS FOR CHILD

	Total	Males	Females	Lower	Middle	Upper
Junior High	0	0	0	0	0	0
Senior	49	21	28	29	14	6
Apprenticeship	0	0	0	0	0	0
Vocational School	4	1	3	2	1	1
College	213	110	103	38	114	61
Graduate School	15	8	7	0	3	12
Total	281	140	141	69	132	80

Lower socioeconomic children had not been taken to as many places by their parents, as indicated in Table XIII.

TABLE XIII

NUMBER OF PLACES CHILD HAS BEEN
(Library, Zoo, Airport, and Others)

	Total	Boys	Girls	Lower	Middle	Upper
1	6	4	2	3	2	1
2	14	5	9	8	5	1
3	27	13	14	8	14	5
4	44	25	19	19	16	9
5	61	23	38	16	27	18
6	73	37	36	9	44	20
7	69	44	25	8	40	21
Total	294	151	143	71	148	75

Variables from the registration form used in the regression analysis with first grade reading and arithmetic scores as dependent variables were (1) age, (2) father's occupation, (3) education of father, (4) education of mother, (5) number of outdoor activities of child, and (6) number of indoor activities of child. Significant at the .05 level were (1) age of the child, and (4) education of the mother. These two variables were combined in the regression analysis with significant variables from all other measuring instruments. Education of the mother was the only Registration Form variable which emerged as significant in the combined analysis.

The Registration Form provided confirming information of the differentiation of lower, middle and upper group status, particularly for the lower socioeconomic group. The only predictor variable to emerge from registration information was education of mother.

Socioeconomic Findings

Socioeconomic status did not emerge as a predictor variable for first grade reading or arithmetic achievement. At the second grade, socioeconomic status became a predictor variable for both reading and arithmetic. The lower socioeconomic group of this study had been in Title I, Elementary and Secondary Education Act, schools since their entrance in kindergarten. At the end of first grade, the lower socioeconomic group had a mean percentile ranking of 51.60 with a standard deviation of 23.72. (See Table IV, Appendix C). By the end of second grade, their percentile mean had dropped to 40. The explanation for the lack of socioeconomic status emerging as a predictor variable in the first grade, but becoming significant for the second grade, should be explored further.

There appears to be less discrepancy between middle and upper than between lower and middle socioeconomic groups, as shown in Table XIV. (Also see Table V, Appendix C).

Five variables significant at the .05 level or higher emerged as predictor variables in the regression equation computing second grade lower socioeconomic reading achievement. Five variables entered the stepwise regression analysis in the order indicated. The corresponding multiple correlations computed at each step are in the column to the right of the predictor variables in Table XIV.

TABLE XIV

SECOND GRADE ACHIEVEMENT PREDICTOR VARIABLES*
Lower Socioeconomic Group
(N = 43)

Reading

Variable	Mean	S.D.	M.R.	R^2
Teachers See Peer Rating	2.37	.72	.58	.33
Physical Skills	8.84	1.38	.65	.42
Arithmetic (WISC)	9.26	2.77	.69	.48
Teachers' Predictions	1.88	.96	.71	.51
Sociometric-Positive Role	6.35	6.97	.74	.55
Reading Raw Score	31.49	10.98		

TABLE XIV (Cont.)

Arithmetic

Variable	Mean	S.D.	M.R.	R^2
Numbers (Met.)	13.95	3.97	.49	.24
Arithmetic Raw Score	60.33	5.91		

*Significant at or above .05 level.

Correlation and causation are still often equated, even at rather sophisticated levels. This has added to the reigning confusion in the prediction of academic success. Research in this area has been inconclusive, but bits of the total pattern are coming into focus. The Coleman (1966, p. 325), report created heated controversy with the statement, "...schools bring little influence to bear on a child's achievement that is independent of his background and general social context...indicating the small independent effect of variations in school facilities, curriculum, and staff upon achievement."

The conclusion often reached, based upon Coleman's statement, is that public schools can do little to change the pattern of failure of the lower socioeconomic child. To date, the results of attempts toward academic improvement have been somewhat discouraging and appear to confirm Coleman's 1966 conclusion, though perhaps an important intervening step has been overlooked. Does the child's background affect an unrecognized variable, which in turn affects the child's achievement? Teacher and peer expectancy may be the intervening variables which affect pupil achievement. If these intervening variables can be changed, perhaps lower class academic achievement can be improved, even though the child's family background cannot be changed.

The multiple correlation for predicting second grade reading success for the lower socioeconomic group was the highest obtained for any group in the three-year longitudinal study. The mean reading score for this group also was the lowest correlation.

Not one of the variables found to be significant in predicting second grade reading for the lower socioeconomic group appeared significant in predicting reading for the middle socioeconomic group. Only the number of times the child "was seen in a positive sociometric role" emerged in the regression equation for both lower and upper socioeconomic groups.

Of the five significant variables in predicting reading success for the lower group, two were ratings by the kindergarten teacher and one was a rating by the child's kindergarten peers. IQ scores, readiness scores, maturity development scores, demographic variables, and other measured variables, were not significant predictor variables.

Do these findings bring into focus another part of the pattern of prediction of academic achievement? Are there clues to additional research in the fact that three of the predictor variables were subjective ratings by the child's teacher and peers?

Prior research has demonstrated that a teacher's expectancy may become a self-fulfilling prophecy. In one experiment in a lower socioeconomic school, teachers were told certain children would "bloom intellectually", (Rosenthal, 1968). Actually, these children were randomly selected. The "blooming" came off as scheduled. Children at higher levels of achievement were affected as much as those at lower levels. This points to the exciting and startling possibility that professionally prepared, well intentioned teachers, may unknowingly and in unrecognized ways, be contributing to children's failure or success. A study by W. Victor Beez as cited in Rosenthal (1968), demonstrated that when half of the Head Start teachers were led to expect good symbol learning and the other half to expect poor symbol learning, their expectancies became significant self-fulfilling prophecies.

In the present study, teacher expectancies were not aritficially induced, but it cannot be asumed that these expectancies were not operating. The teacher and peer ratings lend credence to the proposition that both teacher and peer expectancies were present, even at kindergarten level. The high relationship between the teacher and peer ratings and achievement, coupled with lowered achievement, would suggest that the expectancies were for a lower level of achievement for low socioeconomic groups than for other groups. Was the principle of self-fulfilling prophecy operating?

Lower class children have been shown to respond more quickly than middle class children to nonverbal messages from the teacher (Mehrabian, 1968). Are teachers conveying, without words, their low achievement expectancies for lower class children?

Teachers have been taught on the basis of correlation relationships and "logical" empirical evidence that children ranking low on many of the variables listed earlier are poor academic risks. Low ranking children have achieved at an inferior level so both teachers and pupils expectations have been reinforced.

Results of the Bend, Touch, Twist subtest, which were significant for the lower socioeconomic children, lend themselves to speculation. Correlations between motor abilities and beginning reading success have given rise to numerous theories of perceptual-motor development. The negative correlation found in this research tends to give rise to a more mundane suggestion: children successful in physical development may gain status in the lower socioeconomic class and therefore may not be as motivated nor have the need for academic success of higher socioeconomic groups.

Children of the lower socioeconomic group achieved a mean IQ score of 97 compared with a mean IQ score of 107 for the middle socioeconomic group. IQ did not emerge among the variables significant in predicting academic achievement for the lower socioeconomic group. The correlation between the lower group IQ and second grade reading was .21. IQ accounted for only 4 percent of the variation in the second grade reading scores. The highest correlation found between IQ and second grade reading scores for any group was .48, for the upper socioeconomic group. In this group, IQ accounted for 23 percent of the variation in the second grade reading scores.

The emphasis placed upon IQ scores for the lower socioeconomic group seems misplaced if it accounts for only 4 percent of the reading variation. Explanations of lack of reading success based upon depressed IQ scores find little support in this three-year longitudinal study.

Home variables, such as education of the parents and occupation of the father, have been assumed to have greater influence than variables from the school environment. Commonly accepted is the assumption that the school can do little if the home can't be changed. In this study home variables did not survive in the regression equation.

Kindergarten teacher and peer ratings on three measures did remain significant in predicting reading success at the end of the second grade for the lower socioeconomic group. Were the teachers influenced by the variables associated with low socioeconomic status and led by these variables to expect lower achievement from lower class pupils? Was this same expectancy operating among the pupils themselves? Do lower class pupils have a negative academic image of themselves and their peers and expect and accept academic failure even before it comes?

The teachers with a mental set toward what lower socioeconomic class children can accomplish, may be the undefined, but important variable here. This three-year longitudinal study and others (Cohen, 1963b), confirm the high relationship between teacher's prediction of pupil's achievement and that achievement. Is this a self-fulfilling prophecy and an unwitting predetermination instead of a prediction?

Perhaps education has built up a mythology, based on correlational relationships and not based on cause and effect, for the lower socioeconomic class. Needed then, are teachers willing and able to discard preconceived ideas of what makes for academic success for lower socioeconomic children and to precede with an openness hitherto uncommon.

The second grade achievement predictor variables for the middle and upper socioeconomic groups do not do as good a job in reading prediction as do the second grade lower socioeconomic predictor variables, as shown in Table XV. More significant variables emerged for the lower than for other socioeconomic groups. For reading achievement, one subtest and three subjective ratings emerged for the lower group. A rationale for the emergence of these variables is not readily available.

Summary of Socioeconomic Findings

Socioeconomic findings indicate that:

1. More accurate predictions can be made for the lower socioeconomic group's second grade reading achievement than for any other socioeconomic group. Achievement of the lower socioeconomic group is the poorest.

2. The second grade upper socioeconomic group was the only group where a teacher's rating did not emerge as a predictor variable.

3. Peer rating was a significant second grade reading predictor variable for both lower and upper socioeconomic groups.

4. Better predictions can be made for second grade arithmetic achievement in the middle and upper socioeconomic group than can be made for reading achievement in those groups.

TABLE XV

SECOND GRADE ACHIEVEMENT PREDICTOR VARIABLES*

LOWER SOCIOECONOMIC GROUP

(N = 43)

READING

Variable	Mean	S.D.	M.R.	R^2
Teachers See Peer Rating	2.37	.72	.58	.33
Physical Skills	8.84	1.38	.65	.42
Arithmetic (WISC)	9.26	2.77	.69	.48
Teachers'Predictions	1.88	.96	.71	.51
Sociometric Positive Role	6.35	6.97	.74	.55
Reading Raw Score	31.49	10.98		

ARITHMETIC

Variable	Mean	S.D.	M.R.	R^2
Numbers (Metropolitan)	13.95	3.97	.49	.24
Arithmetic Raw Score	60.33	5.91		

*Significant at or above the .05 level.

TABLE XV (CON'T)

SECOND GRADE ACHIEVEMENT PREDICTOR VARIABLES*
MIDDLE SOCIOECONOMIC GROUP

(N = 90)

READING

Variable	Mean	S.D.	M.R.	R^2
Matching (Metropolitan)	11.63	3.68	.44	.19
Teachers' estimate of social growth	2.34	.95	.48	.23
Reading Raw Score	41.78	7.92		

ARITHMETIC

Variable	Mean	S.D.	M.R.	R^2
Numbers (Metropolitan)	14.91	4.32	.60	.35
Sociometric Chosen	2.72	1.90	.63	.40
Matching (Metropolitan)	11.63	3.68	.66	.44
Arithmetic Raw Score	63.31	5.05		

UPPER SOCIOECONOMIC GROUP

(N = 55)

READING

Variable	Mean	S.D.	M.R.	R^2
Digit Span (WISC)	10.91	3.10	.53	.28
Sociometric Positive Role	10.65	14.25	.58	.33
Reading Raw Score	42.93	7.15		

ARITHMETIC

Variable	Mean	S.D.	M.R.	R^2
Block Design (WISC)	11.33	2.60	.53	.29
Education of the Mother	12.45	3.61	.65	.43
Arithmetic (WISC)	10.47	2.35	.71	.50
Arithmetic Raw Score	64.67	5.36		

*Significant at or above the .05 level.

Sex As A Predictor Variable

Sex was a predictor variable only for first grade reading, as shown in Table XVI. (See Table VI, Appendix C for additional sex differences on predictor variables.) Separate regression equations were computed for males and females with first grade reading success as the criterion.

TABLE XVI

FIRST GRADE PREDICTOR VARIABLES*

Male

(N = 114)

READING

Variables	Mean	S.D.	M.R.	R^2
Numbers (Met.)	13.4	4.5	.68	.46
T. P.	2.0	1.1	.72	.52
Titles	26.4	14.1	.75	.56
Matching (Met.)	10.8	3.9	.77	.60
Visual 3	6.3	2.1	.79	.62
Reading Percentile	55.6	28.3		

Female

(N = 112)

READING

Variables	Mean	S.D.	M.R.	R^2
T. P.	2.4	1.0	.59	.35
Information (Met.)	9.4	2.9	.67	.44
Education Mother	11.8	3.4	.70	.49
Matching (Met.)	12.5	3.8	.73	.53
C. A. Man	8.1	1.0	.74	.55
Reading Percentile	73.1	23.4		

*Significant at or above the .05 level.

A pattern seemed to appear even though different tests emerged, with the exception of Matching, as predictor variables for males and females. The regression analyses for each of the sexes yielded three types of measures, according to sensory channels of learning and performance, as demonstrated in Table XVII.

TABLE XVII

Channels of Learning	Male Variable	Female Variable
(1) Auditory-visual (intersensory)	Numbers	Information
(2) Visual-visual (intrasensory)	Matching	Matching
(3) Visuo-motor (intersensory)	Visual 3*	Complete-A-Man

*The fourth male predictor (Titles) may have a strong visuo-motor component.

The predictor variables were analyzed to suggest specific skills which were tapped. A rationale suggested by Myklebust (1954) and Johnson (1967), considering channels of learning, was explored. An experience hierarchy was considered along with development of perceptual and symbolic skills, (Strauss, 1955), as indicated in Table XVIII.

TABLE XVIII

EXPERIENCE HIERARCHY

Sensation	Perception	Imagery	Symbolization	Conceptualization
Impingement of a stimulus upon an end organ.	Appropriate recognition of ongoing sensation.	Thought picture can be completed from cue.	A word represents a certain experience.	A word represents catagories of experiences.

TABLE XVIII (Con't)

PERCEPTUAL STAGES

Global	Analytical	Synthesis
Grasping outlines of Stimuli without penetrating data.	Attains better knowledge of details and what he wants to analyze.	Involves scrutinizing the detail without losing a view of the whole.

LANGUAGE LEVELS

Inner Language	Receptive Language	Expressive Language
Ability to relate one experience to another or to a symbol.	Ability to comprehend the spoken word and later reading.	Ability to express ideas and thoughts.

The Numbers subtest of the Metropolitan Test requires good integration of general information and orientation as well as the handling of number concepts.

1. Experiences -- all levels through conceptualization
2. Perceptions -- all levels through synthesis
3. Language -- inner and receptive
4. Learning channels -- primarily auditory-visual (intersensory)

Visual 3 of the School Readiness Tests used at the Gesell Institute, besides demanding orientation for right and left, taps:

1. Experience -- visual imagery and recall
2. Perception -- all levels through synthesis
3. Language -- inner
4. Learning channels -- visuo-motor (intersensory)

The Titles subtest of Torrance's Nonverbal Test of Creativity provides another unexpected source of prediction. (It is interesting to note that perceptual syntheses and a drawing task have preceded the formulation of a good title.)

1. Experiences -- all levels through imagery and probably through conceptualization.
2. Perceptions -- all levels through synthesis
3. Language -- all levels through expressive
4. Learning channels -- visual-auditory-oral (intersensory)

The Matching subtest of the Metropolitan Readiness Test appears to measure basic reading readiness skills involving visual matching and discrimination. This is considered an intrasensory task representing primarily perceptual intactness.

Information of the Metropolitan Readiness Tests demands the ability to understand content words within the sentence as well as the entire integrated meaning of the sentence. It, also, requires the ability to get organized information from a sentence by adapting to changes in the syntax employed.

1. Experience -- all levels to conceptualization
2. Perception -- all levels through synthesis
3. Language -- inner and receptive
4. Learning channels -- auditory-visual (intersensory)

Complete-A-Man of the School Readiness Tests used at the Gesell Institute is an example of holding a whole image in mind while examing and supplying specific details.

1. Experience -- all levels at least through symbolization
2. Perception -- all levels through synthesis
3. Language -- inner
4. Learning channels -- visual, visuo-motor

Tables XIX and XX propose a rationale utilizing the channels of learning, experience hierarchy, perceptual stages and language levels for reading predictor variables for males and females.

Thus, from these illustrations, it is suggested that prediction of reading success might be based on an estimate derived from the following:

1. An intersensory (auditory-visual) symbolic function (example: Numbers in males, Information in females.)
2. An intrasensory perceptual function (example: Matching for both males and females.)
3. A visuo-motor task that stresses intrasensory imagery (example: Titles and Visual 3 for males and Complete-A-Man for females.)

The computer analysis revealed that these parameters have the same relative rank order, regardless of sex.

These three types of measures allow for a sample of behavior which includes key considerations of perception, imagery, and symbolization. Sensation is not significant since all subjects appeared to respond normally to audition and vision. Conceptualization at this stage in life is probably a direct product of perception, imagery, and symbolization. Therefore, with these three measures, it may be possible to assess the three most vital steps on the hierarchy of experience.

This analysis may indicate that if a sample is made across the experience hierarchy and according to the various combinations of intra- and inter-sensory (and motor) learning channels, reading achievement may be predicted with some success. This seems to verify the hypothesis that reading failures are due to a variety of causes.

TABLE XIX

A RATIONALE FOR READING PREDICTOR VARIABLES

MALES

Numbers: auditory-visual
Titles: visual-oral (visuomotor)
Matching: visual-intrasensory
Visual 3: visuo-motor

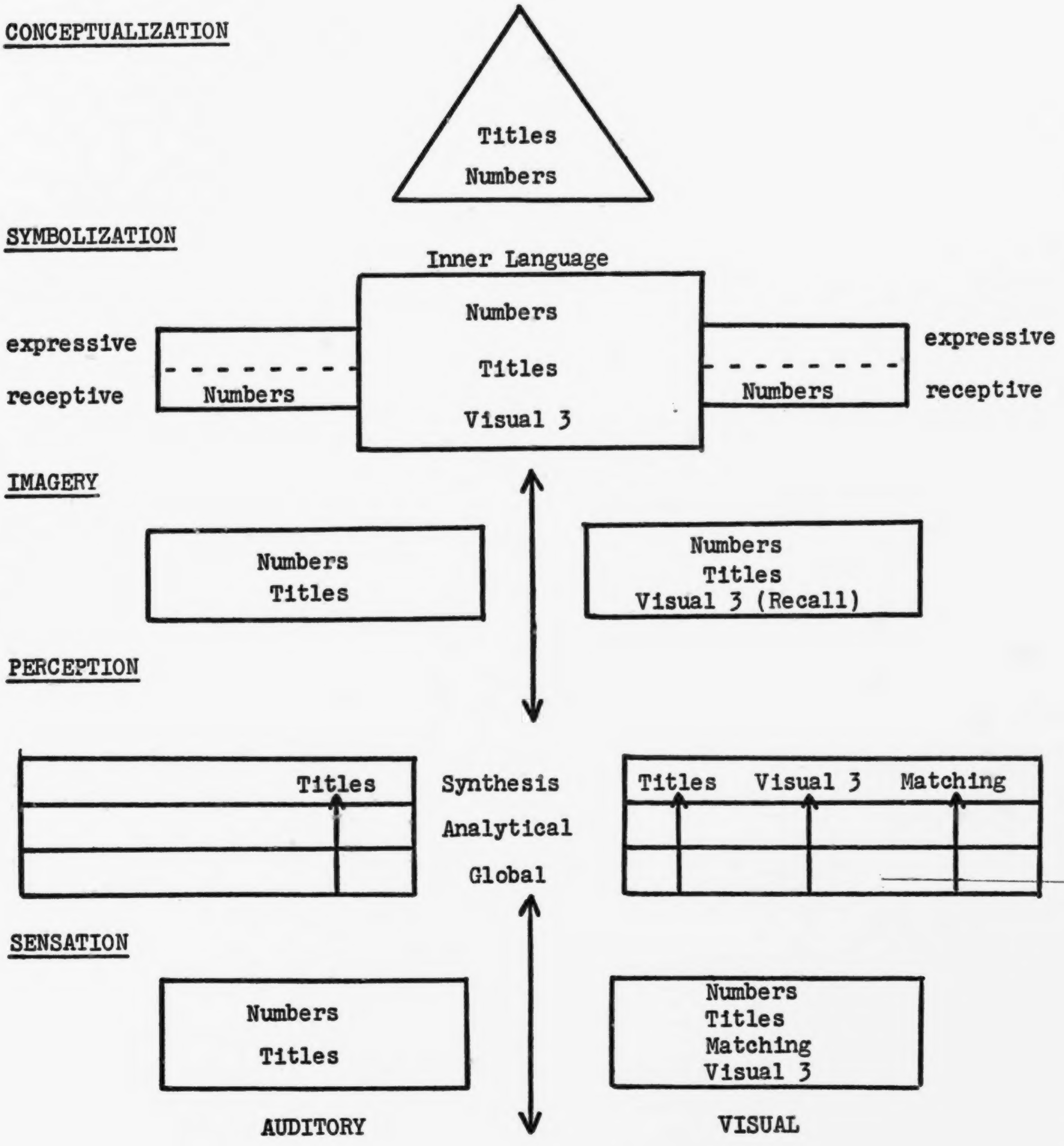
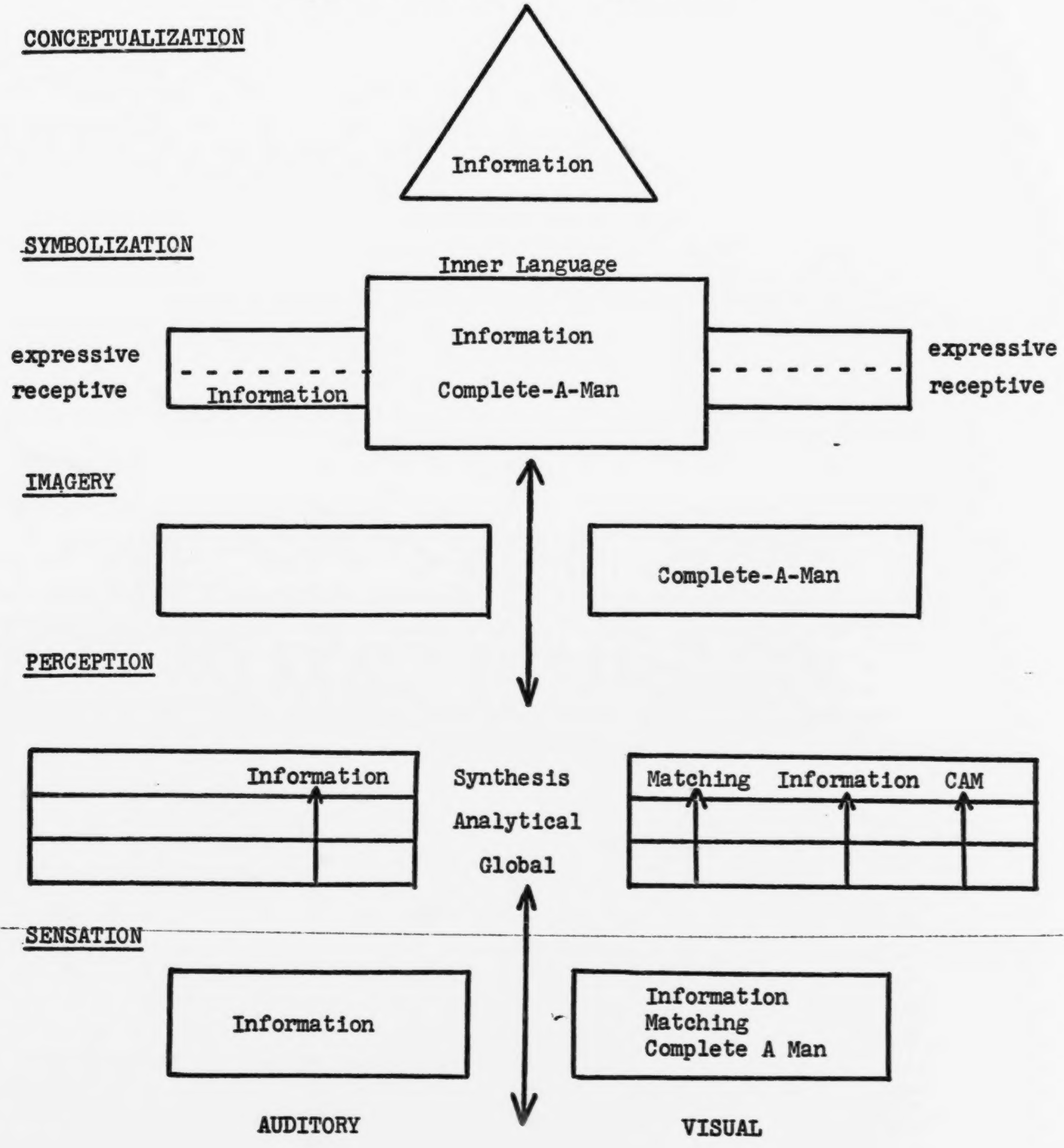

CONCEPTUALIZATION
Titles
Numbers
SYMBOLIZATION
Inner Language
Numbers
Titles
Visual 3
expressive
receptive
Numbers
expressive
receptive
Numbers
IMAGERY
Numbers
Titles
Numbers
Titles
Visual 3 (Recall)
PERCEPTION
Titles
Synthesis
Analytical
Global
Titles
Visual 3
Matching
SENSATION
Numbers
Titles
Numbers
Titles
Matching
Visual 3
AUDITORY
VISUAL

TABLE XX

A RATIONALE FOR READING PREDICTOR VARIABLES

FEMALES

Information:	auditory-visual
Matching:	visual intrasensory
Complete-A-Man (CAM):	visuo-motor


CONCEPTUALIZATION
Information
SYMBOLIZATION
Inner Language
expressive
receptive
Information
Information
Complete-A-Man
expressive
receptive
IMAGERY
Complete-A-Man
PERCEPTION
Information
Synthesis
Analytical
Global
Matching
Information
CAM
SENSATION
Information
Information
Matching
Complete A Man
AUDITORY
VISUAL

It must be noted that the test measures used were not designed, nor controlled, to measure precisely the parameters suggested in this analysis. The trends noted may serve, however, as the best estimate presently available for the "real truth."

One additional factor should be considered. Sex did emerge as a predictor variable for first grade reading. Though comparable skills seem to have been tapped, in both males and females,different measures appeared necessary to do the tapping. The zero order correlations between measurements were not high enough to be considered interchangeable for either sex.

Summary of Findings on Sex

Sex was a significant predictor variable of first grade reading success. Prediction of first grade reading success may be made if there is an estimate of (1) an intersensory (auditory-visual) symbolic function, (2) an intrasensory perceptual function, and (3) a visuomotor task that stresses intrasensory imagery. Though comparable skills for the sexes seem to be tapped, and in the same order, different measures are necessary to do the tapping.

Findings on Age

Public school entrance age becomes entangled in opposing educational philosophies. Conflicting opinions, and some research, claim certain minimum ages necessary for academic success. Advocates of early childhood education question the desirability of demanding that children meet school program requirements. Programs should meet the requirements of children, is their claim.

More sophisticated research in the past five years tends to bring strong evidence to bear refuting the value of age as a predictor variable for academic success. Opinions, however, among professional educators and reading experts do not agree, it seems, with reported research evidence.

For both reading and arithmetic achievement, age did not survive as a significant variable, at the .05 level, for the first grade total group, males or females. Sex was a significant variable only at the first grade level.

For both reading and arithmetic achievement at the second grade level, age did not survive as a significant variable, at the .05 level, for the total group or for the lower, middle, or upper socioeconomic groups. At the second grade level neither age nor sex survived. Socioeconomic level emerged as a significant predictor variable for both reading and arithmetic achievement in the second grade.

The kindergarten teacher's prediction of the child's success in reading survived as a predictor variable for first grade reading and arithmetic success for the total group and for males and females.

Primary teachers commonly emphasize and equate, age and readiness. There was no significant relationship in this study, however, between kindergarten teachers' prediction of the child's success in reading and his age.

Summary of Findings on Age

Age did not emerge as a significant predictor variable for academic success of first or second graders. Age was not significantly related to kindergarten teachers' prediction of reading success. Research over the last five years appears to agree, in large measure, with the findings of this study. Age does not hold up as a significant predictor variable of academic success.

Findings From The Metropolitan Readiness Test

The Metropolitan Readiness Test and the Metropolitan Primary Achievement Tests are used in the School District where the study was made. It may be expected that the Metropolitan Readiness Test will correlate higher with the Metropolitan Achievement Tests than other readiness tests.

Subtest scores of the Readiness Test are shown in Tables VII, VIII, and IX, Appendix C, by total group, sex, age and socioeconomic levels. The general pattern of scores appears to follow reports from the literature. Males and the lower socioeconomic group showed a tendency to have lower scores.

The Numbers subtest was the first predictor which entered the model for the first grade total group reading success and male reading success. Mitchell (1962), reported a higher correlation between the Numbers test than any of the reading readiness tests. No explanation for this result has been found in the literature. A possible explanation is suggested in this study in the section discussing sex. The Numbers test may have predictive values for reading that have been overlooked.

Three Readiness scores, Numbers, Matching, and Information, emerged as predictor variables of first grade achievement and were included in the combined variables regression equation, as shown in Table XXI.

TABLE XXI

MULTIPLE CORRELATION: SELECTED METROPOLITAN READINESS SUBTEST SCORES* AND FIRST GRADE ACHIEVEMENT

Significant Metropolitan Subtest	Total Group Subtest Scores (N = 226)		First Grade Reading Achievement		First Grade Arithmetic Achievement	
	Mean	S.D.	M.R.	M.R.^{2}**	M.R.	M.R.^{2}**
Numbers	14.24	4.55	.60	.36	.59	.35
Matching	11.61	3.98	.66	.44	.67	.44
Information	9.01	3.04	.67	.45	.68	.47

*Significant at the .05 level or higher.
**Multiple Correlations.

In addition to these scores, the Draw-A-Man supplementary test from the Metropolitan Readiness Test was included in the combined regression equation.

Findings On Teachers' Estimate Of Pupil Progress

Only two subtests of the Teachers' Estimate of Pupil Progress in Reading were significant predictors: (1) Reading Prediction, and (2) Visual Perception, as indicated in Table XXII.

TABLE XXII

TEACHERS' ESTIMATE OF PUPIL PROGRESS IN READING

First Grade Achievement

(N = 226)

	READING			ARITHMETIC
	Mean	S.D.	M.R.^{2}	M.R.^{2}
Reading Prediction	2.24	1.06	.633	.574
Visual Perception	2.29	1.00	.643	

Zero order correlations between first grade achievement and the separate items of the Teachers' Estimate of Pupil Progress in Reading are shown in Table X, Appendix C.

Significant at the .01 level were the relationships between the teacher ratings on the subtest scales of Teachers' Estimate of Pupil

Progress in Reading and socioeconomic status. Sex was significant at the .01 level for Visual Perception, in favor of the females. The teachers gave the females higher ratings at the .05 level. Age was significant except for Speech and Reading Prediction, as indicated in Table XXIII.

TABLE XXIII

CHI SQUARE SIGNIFICANCE OF TEACHERS' ESTIMATE
OF PUPIL PROGRESS IN READING

	Age	Socioeconomic*	Sex
Auditory Perception	.05*	.01	N.S.
Speech	N.S.	.01	N.S.
Visual	.05*	.01	.01 level*
Motor Ability	.05*	.01	N.S.
Multi-Sensory	.01*	.01	N.S.
Thinking	.05*	.01	N.S.
Prediction Reading	N.S.	.01	.05 level*
	*Older Higher	*Lower Lowest Middle highest	*Females higher

For first and second grade reading and arithmetic prediction, only one subtest of the Teachers' Estimate of Pupil Progress in Reading was significant, Reading Prediction. Whatever the teachers are rating, they appear to be rating the same thing for each item. Perhaps, then, only the one subtest is needed.

Findings On Teachers' Estimate Of Social-Emotional Maturity

Four subtests of the Social-Emotional Maturity rating scale were significant predictors of first grade achievement and were included in the combined variables: (1) Social-emotional Growth, (2) Leadership, (3) Needs Teacher Control, and (4) Teachers See Peer Rating, as shown in Table XXIV. The other tests did not prove significant in the stepwise multiple regression equation. For their zero order correlations, see Table XI, Appendix C.

No subtest of the Social-Emotional Maturity Scale was a significant predictor variable at the first grade level. At the second grade level, the subtest, "Teachers See Peer Rating," was a significant predictor variable in reading for the total group and for the lower socioeconomic group. The subtest, "Teachers' Estimate of Social Growth," was a significant second grade reading predictor variable for the middle socioeconomic group.

No ratings were significant for any group in second grade arithmetic or for the upper group in reading.

TABLE XXIV

TEACHERS' ESTIMATE OF SOCIAL-EMOTIONAL MATURITY

First Grade
(N = 226)

	READING			ARITHMETIC
	Mean	S.D.	M.R.^{2}	M.R.^{2}
Social-Emotional Growth	1.96	.97	.477	.479
Leadership	1.71	1.00	.518	.514
Needs Teacher Control	2.49	1.25	.535	
Teachers See Peer Rating	2.40	.85	.548	

Relationship Between Teacher Rating Scales

The intra-and-inter-correlations of the two teacher rating scales are shown in Table XII, Appendix C. The inter-correlations of the Teachers' Estimate of Reading Progress ranged from .62 to .89. In the Teacher Rating of Social-Emotional Maturity, one item, "Needs Teacher Control," appeared not to be related to the other items. The same item had the lowest intra-correlation with the items of the Teachers' Estimate of Pupil Progress in Reading. (See Table X, Appendix C).

The high inter-and-intra-correlations of the two rating scales appear to provide an answer for the few items showing significance as predictor variables.

Summary Of Findings Of Teacher Rating Scales

When kindergarten teachers rated pupils in estimating their progress in reading, age was not a factor. Though it is common for teachers to express the belief that age is important at the kindergarten level, evidently this belief is not a significant factor in the actual teacher rating.

Teachers rated the middle group highest in estimating progress, and the lower group the lowest. Teachers rated females somewhat higher than males. When a teacher rated a child high on one subtest and high on one scale, there was a tendency to rate him high on all. A simple rating on a five-point scale estimating a child's progress appears to be as effective as using all seven subtests. This rating scale need not be complicated.

Teachers are most accurate in their ratings of the lower socioeconomic group and the least accurate for the upper group.

Findings Of The Sociometric Evaluations

A copy of the sociometric evaluation given in the kindergarten is in Table I, Appendix B. A table showing the sociometric subtest scores of the total group by each sex and each age group and by each sociometric level is given in Tables XIII, XIV, and XV, Appendix C. In common with the usual school setting findings were:

1. Females were seen in a more positive role than males.
2. The average age child was seen in a more positive role than either the younger or older age groups.
3. The lower socioeconomic group was seen in the most negative role of all groups.

Sex differences on the sociometric subtests were explored, as shown in Table XXV.

TABLE XXV

CHI SQUARE SIGNIFICANCE OF MALE, FEMALE SOCIOMETRIC CHOICE

	Male	Female	Significance
Chosen Cry Baby	higher		.01
Chosen Happiest			N.S.
Chosen Positively			N.S.
Chosen Negatively	higher		.01
Chose Self Positively	higher		.01
Chose Self Negatively			N.S.
Chosen Liked Best			N.S.
Times Chosen			N.S.

Though males significantly chose themselves more for positive roles, they were significantly chosen by class members for negative roles. This may have implications for the social growth of males and females.

When the sociometric subtests were used in a regression analysis to predict first grade reading, only one subtest "Number of Times Child Was Seen in a Positive Role," was significant. Another subtest, "Chosen As One of the Three Best Liked," was a significant first grade arithmetic predictor.

These two subtests were combined with the significant predictor variables from the other instruments to compute the new regression equation for first and second grade achievement. Of the combined variables, no sociometric variable emerged as a significant predictor of first grade reading or arithmetic achievement.

For the second grade lower and upper socioeconomic groups, "Seen by Others in a Postive Role," was a significant predictor variable for reading. For second grade arithmetic, the sociometric subtest, "Chosen as One of Three," was a predictor variable for the middle socioeconomic group.

Further refinement of sociometric techniques may provide more information concerning the relationships between peer acceptance and primary achievement. This association may have as a basis the relationships between self-concept and socialization with academic success.

Findings of the Gesell Developmental Tests

The present study evaluated 226 children in the first grade on the Gesell Developmental Tests. (See Tables, XVI, XVII, and XVIII, Appendix C). The placement for the entire group was 2.05 with a standard deviation of .86 on a scale of (1) high average, (2) average, (3) low, and (4) kindergarten. The Metropolitan reading average percentile for this group, in April of the first grade, was 64.3 and in arithmetic was 73.9. Both Metropolitan achievement scores were above the average 50th percentile.

Test placement zero order correlations between Gesell Developmental scores and end of first grade reading achievement were slightly higher than individual subtest scores of the Gesell Developmental Tests. In arithmetic, this was not true, as indicated in Table XXVI.

TABLE XXVI

ZERO ORDER CORRELATIONS OF GESELL TESTS
AND FIRST GRADE ACHIEVEMENT

Reading		Arithmetic	
Test Placement	.495	Numbers	.459
Commands	.471	Commands	.407
Numbers	.425	Test Placement	.375

Four subtests were selected to be used in the combined variable regression analysis: (1) Commands, (2) Numbers, (3) Visual 3, and (4) Complete-A-Man, as shown in Table XXVII.

TABLE XXVII

MULTIPLE CORRELATIONS GESELL TESTS AND FIRST GRADE ACHIEVEMENT WITH TEST PLACEMENT

Reading			Arithmetic		
	M.R.	R^2		M.R.	R^2
Test Placement	.497	.247	Numbers	.459	.211
Commands	.574	.329	Commands	.535	.286
Numbers	.617	.381	Test Placement	.556	.309
Complete-A-Man	.633	.401	Teeth Losses	.570	.325
Visual 3	.650	.423	Complete-A-Man	.580	.336

MULTIPLE CORRELATIONS GESELL TESTS AND FIRST GRADE ACHIEVEMENT WITHOUT TEST PLACEMENT

Reading			Arithmetic		
	M.R.	R^2		M.R.	R^2
Commands	.471	.222	Numbers	.459	.211
Numbers	.553	.306	Commands	.535	.286
Visual 3	.590	.348	Visual 3	.550	.303
Complete-A-Man	.618	.382	Complete-A-Man	.565	.319

The test placement score of males was lower than for females. The lower socioeconomic group was placed lower than the other socioeconomic groups and the higher socioeconomic group was placed the highest. The youngest age group was placed lowest. (See Table XVIII, Appendix C).

At the end of first grade, with the combined variables for the total group of 226, Complete-A-Man and Visual 3, emerged as significant predictor variables for reading. Numbers emerged as a significant predictor variable for arithmetic achievement.

For the males, Visual 3 survived for reading, but none of the subtests survived for arithmetic. For females, Complete-A-Man survived for both first grade reading and arithmetic. At the end of second grade, none of the Gesell Developmental variables emerged as significant, for either reading or arithmetic, for the total group or any of the socioeconomic levels.

Summary of Findings of Gesell Developmental Test

It appears that little is gained, in predicting reading and arithmetic scores at the end of first grade, by administering the entire Gesell Developmental Test during first grade. By administering variables significant at the .05 level, Commands, Numbers, Visual 3, and Complete-A-Man, a multiple R of .62 for reading and .57 for arithmetic was found, compared with .66 for reading and .59 for arithmetic for the entire test.

Since only the four variables appear significant, perhaps the administration of the entire test may be contaminating the resulting test placement. This may well account for the 40 percent considered not ready.

Findings of Creativity Test

This three-year longitudinal study confirmed Cicirelli's (1965, p. 308), hypothesis that the effects of various factors upon creativity and achievement "might profitably be investigated". The study found that (1) sex was a significant predictor variable for reading achievement in the first grade, and (2) socioeconomic level was a significant predictor variable for reading achievement in the second grade. Failure to recognize sex and socioeconomic differences in predictor variables in previous research may account for the inconclusive findings.

The relationship between IQ and creativity is also inconclusive: perhaps sex and socioeconomic differences have not been tested. Eisner (1965), reported no significant relationships emerged between IQ and any of the types of creativity tested. Wade (1968), reported correlations between intelligence and creativity ranged from .18 to .55. Wallach (1968), edited studies which, as he interpreted them, support his contention that Torrance's tests of creativity are essentially a battery of general intelligence assessments.

The Titles test of Torrance's Non-verbal Tests of Creativity had the highest correlation (.27) with end of first grade reading achievement. Titles was used in the regression equation combining significant variables from the various instruments. Titles did not emerge as a significant variable for first grade reading achievement for the total group. Sex was a significant variable, so regression equations for males and females were computed separately. Titles was a significant predictor variable for end of first grade reading success for males, it was not for females.

The regression equation predicting end of second grade reading achievement for the total group did not include Titles as a significant predictor. Since socioeconomic status was a significant predictor, separate regression equations were computed for the lower, middle, and upper socioeconomic groups. Titles was not a significant predictor for second grade reading achievement for any socioeconomic group.

Controversy has centered around whether IQ or Creativity is the better predictor variable. Table XXVIII shows the groups for which the WISC and Creativity tests were significant reading predictors for either first or second grade reading.

TABLE XXVIII

SIGNIFICANT FIRST GRADE READING PREDICTOR VARIABLES

	Total Group	Male	Female
Titles		P	
Digit Span (WISC)	P		
Arithmetic (WISC)			

SIGNIFICANT SECOND GRADE READING PREDICTOR VARIABLES

	Total Group	Lower	Middle	Upper
Titles				
Digit Span (WISC)				P
Arithmetic (WISC)		P		

* P=Significant predictor variable

The results of the three-year longitudinal study to identify, among kindergarten children, factors that make for future academic success suggest:

1. A WISC subtest is a significant first grade reading predictor variable for total group. A WISC subtest is a significant second grade reading predictor variable for the lower and upper socioeconomic groups.

2. A Creativity subtest is a significant first grade reading predictor variable for males.

3. Neither IQ tests nor Creativity tests are significant reading predictor variables for first grade females. Neither IQ tests nor Creativity tests are significant reading predictor variables for second grade total group or the middle socioeconomic group.

If the reading predictor variables had not been identified by sex and socioeconomic levels, all but the Digit Span first grade reading predictor variable would have been masked.

The relationships between intelligence and creativity, intelli-

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gence and achievement, and creativity and achievement were explored. For complete data see Tables XIX , XX, XXI, XXII, XXIII, and XXIV, Appendix C. The correlations for the intellectual and creativity measurements identified as significant reading predictor variables are presented in Table XXIX for total group, for both sexes, and for the three socioeconomic groups.

TABLE XXIX

CORRELATIONS BETWEEN CREATIVITY TESTS AND INTELLIGENCE TESTS

SECOND GRADE

CORRELATIONS	TOTAL GROUP N=188		
	Titles	Digit Span	Arith.
Digit Span	.35	---	.37
Arithmetic	.11	.37	---
First Grade Reading N=226	.25	.52	.42
Second Grade Reading N=188	.34	.37	.27

CORRELATIONS	MALE N=91			FEMALE N=97		
	Titles	Digit Span	Arith.	Titles	Digit Span	Arith.
Digit Span	.29	---	.28	.43	---	.42
Arithmetic	.08	.28	---	.15	.42	---
First Gr. Reading N=226	.26*	.48	.42	.26**	.50	.37
Second Gr. Reading N=188	.43	.30	.18	.07	.38	.36

*N=114, **N=112

TABLE XXIX (Cont.)

CORRELATIONS BETWEEN CREATIVITY TESTS AND INTELLIGENCE TESTS

SECOND GRADE SOCIOECONOMIC GROUPS

CORRELATIONS	LOWER N=43		
	Titles	Digit Span	Arith.
Digit Span	.16	---	.50
Arithmetic	.29	.50	---
First Grade Reading N=55	.24	.44	.40
Second Grade Reading	.14	.09	.30

CORRELEATIONS	MIDDLE N=90			UPPER N=55		
	Titles	Digit Span	Arith.	Titles	Digit Span	Arith.
Digit Span	.29	---	.30	.29	---	.32
Arithmetic	.34	.30	---	-.03	.32	---
First Grade Reading N=55	.12*	.45	.40	.07**	.57	.40
Second Grade Reading	.10	.30	.18	.16	.53	.36

*N=111, **N=60

Two general statements drawn from the information in Table XXIX are:

1. Titles, for most groups, has lower zero order correlations with reading achievement than do the two WISC subtests.

2. Titles has a significantly higher correlation with Digit Span than with Arithmetic for the total group, males, females, and for the upper group. Titles has a significantly lower correlation with Digit Span than with Arithmetic for the lower group. Again, there is the suggestion that the lower socioeconomic child comes from a different population.

The correlations between Titles and other tests of Creativity were higher than were the correlations between Titles and IQ scores. Correlations between Titles and other tests of Creativity were:

Fluency	.89	Task I	.25
Flexibility	.80	Task II	.69
Figures	.87	Task IV	.92
Elaboration	.80	Total Tasks	.94
Activities	.17		

It appears that from 50 to 88 percent of the variation among seven of the Creativity tests is accounted for by Titles. Activities and Task I appear to be tapping different abilities. The correlation between Activities and Task I is .30.

Though the tests of Creativity in this study were not predictors of reading success for different socioeconomic groups, the lower group had significantly lower scores on Titles and on most of the other tests of Creativity. On no Creativity test was the lower group higher than either the middle group or upper group. So, on still another dimension, the lower socioeconomic child enters school with fewer "skills" than his more privileged schoolmates.

Summary of Findings on Creativity

The three-year Longitudinal study on Creativity found, or suggested:

1. Though subtests of the WISC and Creativity Tests were reading predictor variables for certain groups, they never appeared together.

2. Only a small portion of the kindergarten WISC and the Non-verbal Test of Creativity scores have prediction value for first and second grade reading. For some groups, there is no reading prediction value in any of the WISC or Creativity scores.

3. It appears that too great an emphasis has been placed upon both intelligence and creativity in predicting first and second grade reading success. Other variables have greater prediction value than either I Q or Creativity scores.

4. Research in academic achievement prediction measures has usually centered upon a narrow range of measures and upon a small group of subjects without consideration of sex and socioeconomic differences. This three-year longitudinal study emphasized the complexity of research in achievement prediction. Prediction variables must be used only when statistically significant. To be of social

significance, the predictions should provide adequate information for the time and cost involved in obtaining information from the measurements and evaluations.

5. Prediction measures must not be equated with causal measures.

6. If the right questions aren't asked, appropriate answers cannot be obtained. The right questions may not be what are the most efficient predictor variables for academic success, but how can the schools best utilize the special talents brought by kindergarten children? Instead of asking what skills children need to be successful in an academic program, perhaps we need to ask what academic program can be provided for children with certain sets of abilities.

7. Education may need to extend horizons to allow utilization of new dimensions of abilities rather than trying to mold the new dimensions into old patterns of academic success. The potential for creativity may not find fulfillment or measurement in the present curriculum or goals of education.

Findings of the Physical Skills Test

The Bend, Touch and Twist subtest was used in the combined variables to predict first and second grade achievement as indicated in Table XXX. This subtest did not prove to be a significant predictor variable for first or second grade achievement, except as a predictor of second grade reading for the lower socioeconomic group.

For second grade reading in the lower socioeconomic group, the physical skills subtest, Bend, Touch and Twist was a significant predictor which showed a negative relationship.

Possibly the physically adept among lower class pupils find prestige and satisfaction in physical prowess and so have less motivation than others in academic achievement, even at the second grade level.

The Physical Skills Test adapted for this study is included in Table VI, Appendix B.

TABLE XXX

PHYSICAL SKILLS PREDICTOR VARIABLES

First Grade Reading Achievement

	Mean	S.D.	M.R.	R^2
Bend, Touch, Twist	9.53	1.85	.248	.062
Rope Jumping	14.82	7.93	.307	.094

TABLE XXX (Cont.)

PHYSICAL SKILLS PREDICTOR VARIABLES

First Grade Arithmetic Achievement

	Mean	S.D.	M.R.	R^2
Bend, Touch, Twist	9.53	1.85	.219	.045

A SUMMARY OF STUDY FINDINGS

This three-year longitudinal study of 300 children from kindergarten through the second grade, tends to indicate the following:

1. Sex is a significant predictor variable of first grade reading success, but not of first grade arithmetic achievement or second grade reading or arithmetic achievement.

2. Socioeconomic status is a significant predictor variable of second grade reading and arithmetic achievement, but not of first grade reading and arithmetic success.

3. Age is not a significant variable at either first or second grade for any socioeconomic group for reading or arithmetic achievement.

4. Kindergarten teachers' prediction of reading success enter first, in a regression analysis, of total group second grade reading achievement. A simple check on a one-line scale from "little" to "very successful" appears to be all that is needed to make this evaluation.

5. The Numbers subtest of the Metropolitan Readiness Test enters first in the regression analysis for total group first grade reading achievement. The Matching subtest of the same instrument improves the prediction of male and female, first grade reading success. The Metropolitan Readiness Test adds little to the success of predicting second grade reading achievement.

6. Pattern analysis of the Wechsler Intelligence Scale for Children does not appear to be an appropriate approach to identification among kindergarten children of reading success through second grade.

7. Intelligence test scores add no predictive value for first or second grade reading achievement. Digit Span improves second grade reading predictions for the upper socioeconomic group and arithmetic predictions for the lower socioeconomic group.

8. Creativity tests add no predictive value for primary achievement, with the exception of the Titles subtest for male first grade readers and total group second grade arithmetic achievement.

9. The Gesell Developmental Readiness Tests add little predictive value to primary achievement.

10. Too great an emphasis has been placed upon intelligence and creativity in predicting first and second grade reading success.

CONCLUSIONS AND RECOMMENDATIONS

Much research in the United States has attempted to identify, after the fact, causes of reading disability among children. More recently, research has concentrated on predictive studies to identify potential disability readers. This type of research has tended to concentrate its efforts on the utilization of a narrow range of instruments and predictive techniques or on small experimental groups for short periods of time to identify failure in reading.

This three-year study of 300 kindergarten students in the public schools of Cheyenne, Wyoming, was designed to identify those variables which lead to success, as well as failure, in reading to: (1) determine the most sensitive measuring instruments for predicting reading achievement of primary children, (2) combine from all measuring instruments the best predictive variables to plot a regression equation which would be both statistically and socially significant, (3) trace the same subjects through three years of school, kindergarten through second grade, (4) determine pre-reading and learning-to-read experiences, and finally, (5) utilize a representative sample of school children so results can be generalized to a national population of U.S. school children.

Results of this research tend to indicate that educational and administrative school personnel, as well as parents, should question some of the basic assumptions concerning variables such as IQ and chronological age as valid predictors of success in primary school. This study suggests that perhaps further consideration should be given to the skills that are tapped by readiness tests such as the Metropolitan Readiness Test. This research indicates that the Numbers and Matching subtests of the Metropolitan Readiness Test are significant predictor variables of first grade reading and arithmetic achievement. The Information subtest was a significant predictor variable of success in second grade reading.

The significant relationship between beginning reading and the Numbers subtest of the Metropolitan Readiness Test was highlighted in this three-year study. A review of the literature indicates that previous research has failed to note the importance of this relationship between Numbers and success in reading. The Numbers subtest appeared, in this study, to measure skills needed for reading more effectively than did the reading readiness subtests.

Results of the WISC indicated that the Full Scale, Verbal, and Performance IQ scores were not significant predictor variables of either first or second grade reading success. Digit Span, though, was a significant predictor of first grade reading success for lower, middle, and upper socioeconomic children and for upper socioeconomic children in second grade reading success. On the other hand, Arithmetic was a significant predictor of second grade reading success for the lower socioeconomic children.

The Full Scale IQ score emerged as a significant predictor variable of reading success for lower, middle, and upper socioeconomic children in second grade arithmetic achievement, while Performance IQ was a significant predictor variable of first grade arithmetic achievement. The Information and Block Design subtests were significant predictors of total group second grade arithmetic achievement. Block Design and Arithmetic subtests successfully predicted arithmetic achievement only for upper socioeconomic children at the second grade level.

This study tends to indicate that simple pattern analysis of the WISC is inappropriate for diagnosis of primary reading and arithmetic achievement. Rather, a global research approach appears to be necessary.

Results of this three-year study of 300 children, kindergarten through second grade, tend to indicate that their teachers' predictions of future success in school are amazingly accurate, especially for those of the lower socioeconomic group who fail. A teacher's prediction of reading success, made while the subject was in kindergarten, was a significant predictor of first and second grade reading success and of first grade arithmetic achievement. Also, only a simple statement, of the teacher's prediction of reading achievement of the subject, is necessary; more complicated forms add no sensitivity to the measuring scale. The single item on the Teacher's Rating Scale was a significant predictor of first and second grade reading success. The question this research cannot answer is what factors do teachers take into account when they make predictions of reading success? Do the predictions relate to the teacher's knowledge of the correlation between a child's academic success and his family background? It is possible that the ability of teachers to predict the achievement of children in low socioeconomic groups may be a function of these children fulfilling teacher and peer expectations. Perhaps the predictions are a self-fulling prophecy.

The way teachers perceived peer rating was a significant predictor of second grade reading success of lower socioeconomic children. The teacher's estimate of social-emotional growth was a significant predictor of second grade reading success of the middle socioeconomic child.

Results of the Minnesota Nonverbal Test of Creativity indicate that creativity scores may be of small value in predicting primary school achievement. The Titles score was a significant predictor of male first grade reading success and of second grade arithmetic achievement of the total group.

On the Gesell Develomental Test, Visual 3 was a significant predictor of first grade reading success of the total group and of male children only. The Numbers subtest was a significant predictor of first grade arithmetic achievement of the total group.

Physical Skills findings indicated that the Bend, Touch and Twist subtest was the only predictor variable which was significant, and these findings were predictive only of reading success among lower socioeconomic children in the second grade.

Sociometric findings showed that "Seen in Positive Role" was a significant predictor variable of reading success of second grade lower and upper socioeconomic children. "Chosen One of Three" was a significant predictor variable of success in arithmetic among middle socioeconomic children.

Significant findings from demographic variables, were the lack of significance between chronological age and either success in reading or arithmetic achievement for males, females, lower, middle, or upper socioeconomic children in first or second grade. Sex was a significant predictor of first grade reading success, while education of mother was a significant predictor of female and the total group first grade reading success and of arithmetic achievement in the second grade among upper socioeconomic subjects. Socioeconomic status was a significant predictor of second grade reading success and arithmetic achievement.

Summary of Conclusions of Study

General conclusions, concerning prediction of first and second grade reading achievement, which might be drawn from this three-year study of 300 children, indicate that the most significant predictors include:

1. The Numbers subtest of the Metropolitan Readiness Test. The Information and Matching subtests add predictive value for some sub-populations.
2. Digit Span of the Wechsler Intelligence Test for Children. The Block Design and Arithmetic subtests add some predictive power for sub-populations.
3. Visual 3 and Complete-A-Man of the Gesell Developmental Test.
4. Titles from the Minnesota Nonverbal Test of Creativity.
5. Sex for first grade reading success.
6. Socioeconomic status for second grade reading and arithmetic achievement.
7. Education of the mother.
8. Kindergarten teacher's prediction of the subject's reading ability.
9. Kindergarten teacher's rating of the pupil's socio-emotional growth.

10. Sociometric evaluation of "Number of Times Child Is Seen in a Positive Role."

This research tends to indicate that complicated, expensive, time-consuming measurements of predictive reading and arithmetic success in primary school are no more powerful than the predictive variables listed above. Pattern analysis of the WISC is of little or no value in predicting success in beginning reading.

Finally, this study proposes further exploration of the hypothesis that beginning reading skills are developed through an experience hierarchy with the development of perceptual and symbolic skills.

Recommendations for Future Research

Successful predictors discovered in this study of kindergarten through second grade school children in Cheyenne, Wyoming should be tested with other school populations. The training of teachers should be explored to determine if it is possible to train teachers to recognize self-fulling prophecies. Are teacher evaluations more than predictions of predetermination?

Comparable skills of both male and female children need to be measured and in the same order; this is difficult because different tests are necessary for valid measurement of sex-related skills.

Finally, the suggested relationship between teacher and peer group expectations and primary reading achievement of the lower socioeconomic child needs to be studied in detail and under different conditions.

REFERENCES

1. Ames, Louise B. and Richard N. Walker, "Prediction of Later Reading Ability from Kindergarten Rorschach and IQ Scores," Journal of Educational Psychology, Vol. 55,No. 6, 1964, p. 313.

2. Anderson, Harry E. Jr. and others, "Relative Importance of Reading Readiness Factors as Perceived by Various Teacher Groups," Perceptual and Motor Skills, Vol. 24, June, 1967, pp. 899-902.

3. Andres, Micaela Coloma, "Growth Curves and Factor Pattern Changes in First Grade Reading Readiness, Reading Achievement and its Prediction," Dissertation Abstract 65-15, 438, The Florida State University, 1965, p. 4488-4489.

4. Barrett, Thomas C., "Visual Discrimination Tasks as Predictors of First Grade Reading Achievement," Reading Teacher, 18, January, 1965, pp. 465-470.

5. Belmont, Lillian and Herbert G. Birch, "The Intellectual Profile of Retarded Readers," Perceptual and Motor Skills, 1966, pp.787-816.

6. Bentzen, Frances, "Sex Ratios in Learning and Behavior Disorders," American Journal of Orthopsychiatry, 33, 1963, pp.98-99.

7. Berg, Paul C., and Victor M. Rental, "Guides to Creativity in Reading," Journal of Reading, 10, January, 1967, pp. 219-231.

8. Castner, B. M., "Prediction of Reading Disability Prior to First Grade Entrance," The American Journal of Orthopsychiatry, 5, 1935, pp. 375-387.

9. Chall, Jeanne and Shirley Feldmann, "First Grade Reading: An Analysis of the Interactions of Professed Methods, Teacher Implementation and Child Background," The Reading Teacher, May 1966, pp. 569-575,

10. Chandler, Theodore A., "Reading Disability and Socio-Economic Status," Journal of Reading, October 1966, pp. 4-21.

11. Cicirelli, Victor G., "Form of the Relationship Between Creativity, IQ, and Academic Achievement," Journal of Educational Psychology, Vol. 56, No. 6, 1965, p. 308.

12. Cohen, Theodore B., "Prediction of Underachievement in Kindergarten Children," Archives of General Psychiatry, Vol. 9, November, 1963, pp. 42-48.

13. Cohen, Theodore B., "Diagnostic and Predictive Methods with Young Children," American Journal of Orthopsychiatry, 33, 1963, pp. 330-331.

14. Coleman, James S. et al., Equality of Educational Opportunity, Washington, D. C., National Center for Educational Statistics, U. S. Government Printing Office, 1966, p. 325.

15. Cook, Helen M., Ralph Debruler, and Don F. Blood, "Reading Ability in Relation to Several Physical Conditions," Northwest Medicine, January, 1964, pp. 28-31.

16. Darley, Frederic L. and Harris Winitz, "Comparison of Male and Female Kindergarten Children on the WISC," The Journal of Genetic Psychology, 99, 1961, pp. 41-49.

17. Davis, O. L., An unpublished version of a paper presented at the American Educational Research Association convention, Chicago, Illinois, February, 1966.

18. De Hirsch, Katrina, "Predicting Reading Failure," Harvard Educational Review, Vol. 38, No. 2, Spring, 1968, pp. 365-366.

19. Deutsch, Martin, "The Role of Social Class in Language Development and Cognition," American Journal of Orthopsychiatry, 35, 1965, p. 80.

20. Dykstra, Robert, "Auditory Discrimination Abilities and Beginning Reading Achievement," Reading Research Quarterly, 1 (3), 1966, pp. 5-34.

21. Edwards, Allen Jack and M. Elsie Kirby, "Predictive Efficiency of Intelligence Test Scores: Intelligent Quotients Obtained in Grade One and Achievement Test Scores Obtained in Grade Three," Educational and Psychological Measurement, Vol. 24, No. 4, 1964, pp. 941-946.

22. Eisner, Elliot W., "Children's Creativity in Art: A Study of Types," American Educational Research Journal, Vol. 2, No. 3, May, 1965, pp. 125-136.

23. Ewing, John Melvin, "The Development of a Rating Scale to Predict Achievement in Kindergarten," Doctoral Dissertation, University of Nebraska Teachers College, Lincoln, 1966.

24. Fite, June H. and Louise A. Schwartz, "Screening Culturally Disadvantaged, First-Grade Children for Potential Reading Difficulties Due to Constitutional Factors," American Journal of Orthopsychiatry, 35, 1965, pp. 359-360.

25. Gabbard, Hazel F., "Status and Trends in Early Childhood Education," Those First School Years, Vol. 40, No. 1, September, 1960, p. 228.

26. Getzels, Jacob W. and Philip W. Jackson, "Explorations in Cognitive Giftedness," Creativity and Intelligence, John Wiley & Sons, Inc., New York and London, 1962, pp. 25-26.

27. Green, Donald Ross and Sadie Vee Simmons, "Chronological Age and School Entrance," The Elementary School Journal, October, 1962, p. 45.

28. Hall, Vance R., "Does Entrance Age Affect Achievement?" The Elementary School Journal, April,1963, pp. 391-396.

29. Halliwell, Joseph W. and Belle W. Stein, "A Comparison of the Achievement of Early and Late School Starters in Reading Related and Non-Reading Related Areas in Fourth and Fifth Grades," Elementary English, 41, 1964, pp. 631-639.

30. Harootunian, Berj, "Intellectual Abilities and Reading Achievement," The Elementary School Journal, April, 1966, pp. 386-392.

31. Hayes, Robert B. and Joseph S. Nemeth, "An Attempt to Secure Additional Evidence Concerning Factors Affecting Learning to Read," Cooperative Research Project Number 2697, 1964-65.

32. Henderson, Edmund H., Barbara H. Long, and Robert C. Ziller, "Self-social Constructs of Achieving and Non-achieving Readers," The Reading Teacher, November, 1965, pp. 114-118.

33. Henig, Max S., "Predictive Value of a Reading-Readiness Test and of Teachers' Forecasts," The Elementary School Journal, September, 1949, pp. 41-46.

34. Hillerick, R. L., "An Interpretation of Research in Reading Readiness," Elementary English, 43, April, 1965, pp. 359-364 and 372.

35. Hirst, Wilma E. et al., "Identification in the Kindergarten of Factors That Make for Future Success in Reading," A Proposal for the Cooperative Research Board Department of Health, Education, and Welfare, Office of Education, Washington, D. C., 1964.

36. Ilg, Frances L. and Louise Bates Ames, School Readiness Behavior Tests Used at the Gesell Institute, Harper & Row, New York, 1965, p. 328.

37. Irwin, Dale O., "Reliability of the Wechsler Intelligence Scale for Children," Journal of Educational Measurement, Vol. 3, No. 4, Winter, 1966, pp. 287-292.

38. Johnson, Doris and H. R. Myklebust, Learning Disabilities, Grune and Stratton, Inc., New York, 1967.

39. Karlan, Robert, "Physical Growth and Success in Undertaking Beginning Reading," Journal of Educational Research, Vol. 51, November, 1957, pp. 191-201.

40. Kermoian, Samuel B., "Teacher Appraisal of First Grade Readiness," Elementary English, Vol. 39, 1962, pp. 196-201.

41. Kwall, Donna S., John T. Smith, Jr., and Frank M. Lackner, "Functional Relationships Between Sociometric Status and Teacher Ratings: Aspiration Level, Academic and Parent-Child Variables," Proceedings, 75th Annual Convention, APA, 1967, pp. 285-286.

42. Lovell, K., E. A. Gray, and D. E. Oliver, "A Further Study of Some Cognitive and Other Disabilities in Backward Readers of Average Non-Verbal Reasoning Scores," British Journal of Educational Psychology, University of Leeds, 34, November, 1964, pp. 275-9.

43. Malmquist, Eve, Factors Related to Reading Disabilities in the First Grade of the Elementary School, Almqvist and Wiksell, Stolkholm, 1958, pp. 135-136.

44. Mattick, William E., "Predicting Success in the First Grade," The Elementary School Journal, February, 1963, p. 274.

45. Mayans, Anna E., "Early Differential Prediction of First Grade Reading Achievement Among Three Culturally Different Kindergarten Groups," Doctoral Dissertation, University of Cincinnati, Cincinnati, Ohio, 1966, pp. 36-37.

46. McLeod, J., "A Comparison of WISC Sub-Test Scores of Pre-Adolescent Successful and Unsuccessful Readers," Australian Journal of Psychology, Vol. 17, No. 3, 1965, p. 220.

47. Mehrabian, Albert, "Communication Without Words," Psychology Today, September, 1968, pp. 54-55.

48. Meyerson, Daniel Willis, "Effects of a Reading Readiness Program for Perceptually Handicapped Kindergarteners," Dissertation Abstract 016 D637:27 No. 10, Stanford University, 1966, p. 3372-A.

49. Miller, Duane W. and Raymond C. Norris, "Entrance Age and School Success," Journal of School Psychology, Vol. 6, No. 1, Fall, 1967, p. 54.

50. Mitchell, Blythe C., "The Metropolitan Readiness Tests as Predictors of First-Grade Achievement," Educational and Psychological Measurement, Vol. 22, No. 4, 1962, pp. 765-773.

51. Mitchell, B. C., "Predictive Validity of the Metropolitan Readiness Tests and the Murphy-Durrell Reading Readiness Analysis for White and for Negro Pupils," Educational and Psychological Measurement, Vol. 27, pt. 2, Winter, 1967, pp. 1047-54.

52. Morgan, Elmer F. Jr., "Efficacy of Two Tests in Differentiating Potentially Low From Average and High First Grade Achievers," Journal of Educational Research, Vol. 53, No. 8, April, 1969, pp. 300-304.

53. Muma, John R., "Peer Evaluation and Academic Performance," Personnel and Guidance Journal, Vol. 44, No. 4, December, 1965, pp. 405-409.

54. Myklebust, H. R., *Auditory Disorders in Children*, Grune and Stratton Inc., New York, 1954.

55. Nicholson, Alice, "Background Abilities Related to Reading Success in First Grade," *Journal of Education*, 140, February 3, 1958, pp. 7-24.

56. Rabinovitch, Ralph D., Arthur L. Drew, Russell N. DeJong, Winifred Ingram, and Lois Withey, "A Research Approach to Reading Retardation," *Annual Proceedings Association for Research in Nervous and Mental Desease*, New York 37, N. Y., 1954, 34, pp. 363-387.

57. Reid, William R., "Reading Achievement, Social-Class and Subtest Pattern on the WISC," *The Journal of Educational Research*, Vol. 59, No. 10, July-August, 1966, pp. 469-472.

58. Robinson, H. Alan, "Reliability of Measures Related to Reading Success of Average, Disadvantaged and Advantaged Kindergarten Children," *The Reading Teacher*, December, 1966, pp. 203-209.

59. Roe, Helen, *The Psychology of Occupations*, John Wiley and Sons, New York, 1956, p. 151.

60. Rosenthal, Robert, "Self-Fulfilling Prophecy," *Psychology Today*, September, 1968, pp. 46-51.

61. Sapir, Selma G., "Sex Differences in Perceptual Motor Development," *Perceptual and Motor Skills*, 22, 1966, pp. 987-992.

62. Sawyer, Rita L., "Does the Wechsler Intelligence Scale for Children Discriminate between Mildly Disabled and Severely Disabled Readers?" *The Elementary School Journal*, Vol. 66, November, 1965, p. 101.

63. Sheperd, George, "Selected Factors in the Reading Ability of Educable Mentally Retarded Boys," *American Journal of Mental Deficiency*, 71 (4), 1967, pp. 563-570.

64. Silberberg, Norman and Margaret, and Iver Iverson, "Predicting End of First Grade Developmental Reading Test Scores from Gates Reading Readiness Test Scores Administered in Kindergarten," *Proceedings, 75th Annual Convention, APA*, 1967, pp. 291-292.

65. Smith, Hope M., "Motor Activity and Perceptual Development: Some Implications for Physical Educators," *Journal of Health, Physical Education and Recreation*, February, 1968, pp. 28-36.

66. Somwaru, Jwalla P., "A Study of Achievement in Reading: A Report on a Pilot Project," *Ontario Journal of Educational Research*, Vol. 8, Winter, 1965-66, pp. 105-21.

67. Square, James R., "The National Interest and the Teaching of Reading," Challenge and Experiment in Reading, International Reading Association Conference Proceedings, Vol. 7, 1962, p. 95.

68. Stodolsky, Susan S. and Gerald Lesser, "Learning Patterns," Harvard Educational Review, Capitol City Press, 1947, pp. 546-589.

69. Strauss, Alfred and Newell Kephart, Psychopathology and Education of the Brain-Injured Child, Vol. 2, Grune and Stratton Inc., New York, 1955.

70. Tauber, Rosalyn "Identification of Potential Learning Disabilities," Academic Therapy Quarterly, 2 (2), 1966-67, pp. 116-119 and 123.

71. Vilscek, Elaine Catherine, "An Analysis of the Effects of Mental Age Levels and Socio-Economic Levels on Reading Achievement in First Grade," Dissertation Abstract 016 D637:26 No. 2, University of Pittsburg, 1964, pp. 913-914.

72. Wade, Serena, "Difference Between Intelligence and Creativity: Some Speculation on the Role of Environment," Journal of Creative Behavior, Vol. 2, No. 2, Spring, 1968, pp. 97-101.

73. Wallach, Michael A., "Review of Torrance Tests of Creative Thinking by Paul E. Torrance," American Educational Research Journal, Vol. 15, No. 2, March, 1968, pp. 272-281.

74. Wattenberg, William W., and Clare Clifford, "Relation of Self-Concepts to Beginning Achievement in Reading," Child Development, 35, 1964, pp. 461-467.

75. Weintroub, Samuel, "Sex Differences in Reading Achievement," The Reading Teacher, November, 1966, p. 157.

76. Wolaver, John H., "Diagnostic and Predictive Methods with Young Children," or "Prediction of Underachievement in Kindergarten Children," American Journal of Orthopsychiatry, 33, 1963, pp. 330-331.

77. Worley, Stinson E. and William E. Story, "Socio-Economic Status and Language Facility of Beginning First Graders," The Reading Teacher, February, 1967, pp. 400-403.

78. Wozencraft, Marian, "A Comparison of the Reading Abilities of Boys and Girls at Two Grade Levels," Journal of the Reading Specialist, May, 1967, pp. 136-39.

79. Zike, Victor M., "Not All Five Year Olds Are Ready for School," Nation's Schools, Vol. 81, No. 6, June, 1968, pp. 39-41.

APPENDIX A

TABLE I

STATISTICAL DIFFERENCES BETWEEN 98 DROPPED FROM STUDY AND 188 AND 202 REMAINING

	98 Dropped 188 Remaining	98 Dropped 202 Remaining
WISC Tests		
Information	N.S.	N.S.
Arithmetic	N.S.	N.S.
Digit Span	N.S.	N.S.
Block Design	N.S.	N.S.
Verbal IQ	N.S.	N.S.
Performance IQ	N.S.	N.S.
Full IQ	N.S.	.05 higher
METROPOLITAN Test		
Information	N.S.	N.S.
Matching	.05 higher lost	N.S.
Numbers	N.S.	N.S.
Draw-A-Man	N.S.	N.S.
TEACHER RATING SCALES		
Prediction of Reading	N.S.	N.S.
Peers See Him	N.S.	N.S.
Leadership	N.S.	N.S.
Social-Emotional Growth	N.S.	N.S.
Needs Teacher Control	N.S.	N.S.
Creativity Tests		
Titles	N.S.	N.S.
Activities	.05	.05
Task I	N.S.	N.S.
Socioeconomic Status	N.S.	N.S.
Age	N.S.	N.S.
Sex	N.S.	.05
Education of Mother	N.S.	N.S.

TABLE I (Cont.)

	98 Dropped 188 Remaining	98 Dropped 202 Remaining
SOCIOMETRIC		
Seen by other positively	N.S.	N.S.
Chosen one of three	N.S.	N.S.
GESELL DEVELOPMENTAL		
Numbers	N.S.	N.S.
Complete-A-Man	N.S.	N.S.
Commands	N.S.	N.S.
Visual 3	N.S.	N.S.
Bend, Touch and Twist	N.S.	N.S.

APPENDIX A

TABLE II

FOURTEEN RATAINED IN FIRST GRADE

	MEAN	S.D.
WISC		
Information	7.29	2.81
Arithmetic	6.50	2.71
Digit Span	6.71	2.84
Block Design	9.14	3.25
Verbal IQ	83.93	11.63
Performance IQ	87.50	14.40
Full IQ	84.14	12.22
METROPOLITAN READINESS		
Information	4.29	3.17
Matching	4.29	2.46
Numbers	7.79	3.85
Draw-A-Man	1.21	.97
CREATIVITY		
Titles	21.00	13.97
Activities	2.86	2.57
Tasks	24.21	4.61
AGE	64.29	3.54

TABLE II (Cont.)

	MEAN	S.D.
EDUCATION OF MOTHER	10.00	2.15
SEX	12 boys	2 girls
TEACHERS' RATINGS		
Way Peers See	1.71	.99
Leadership	.57	.65
Needs Teacher Control	2.00	1.62
Social-Emotional Growth	.50	.65
Prediction of Reading Success	.71	.73
SOCIOMETRIC		
Seen in Positive Role	4.93	5.86
Chosen 1 of three	1.57	1.34
GESELL DEVELOPMENTAL		
Numbers	2.64	1.65
Complete-A-Man	7.29	1.20
Commands	14.07	4.55
Visual 3	4.71	1.68
Bend, Touch, Twist	8.36	1.50
ACHIEVEMENT TESTS		
First Grade Reading Percentile (first time)	16.64	11.53
First Grade Reading Grade Equivalent (second time)	2.04	.485
First Grade Arithmetic Percentile (first time)	33.07	30.42
First Grade Arithmetic Grade Equivalent (second time)	2.09	.26

APPENDIX A

TABLE III

FIRST GRADE ACHIEVEMENT PREDICTOR VARIABLES*

TOTAL GROUP

(N = 226)

READING

Variable	Mean	S.D.	M.R.	R^2
Numbers (Metropolitan)	14.19	4.58	.63	.40
Teachers'Predictions	2.18	1.08	.69	.48
Matching (Metropolitan)	11.60	3.96	.72	.52
Sex	1.50	.50	.74	.55
Education of the Mother	11.57	3.38	.75	.57
Complete-A-Man	8.00	1.15	.76	.58
Visual 3	6.44	2.02	.77	.60
Digit Span	9.99	3.24	.78	.60
Reading Percentile	64.26	27.36		

ARITHMETIC

Variable	Mean	S.D.	M.R.	R^2
Numbers (Metropolitan)	14.19	4.58	.61	.37
Teachers'Predictions	2.18	1.08	.66	.44
Matching (Metropolitan)	11.60	3.96	.69	.48
Draw-A-Man	1.94	.90	.71	.50
Numbers (Gesell)	1.51	.99	.72	.51
Performance IQ	105.67	14.38	.72	.52
Arithmetic Percentile	73.86	23.24		

*Predictors Significant at or above the .05 level.

APPENDIX A

TABLE IV

SECOND GRADE ACHIEVEMENT PREDICTOR VARIABLES*

TOTAL GROUP

(N = 188)

READING

Variable	Mean	S.D.	M.R.	R^2
Teachers'Predictions	2.31	1.04	.45	.20
Socioeconomic Status	2.05	.74	.57	.33
Teachers'See Peer Rating	2.44	.83	.60	.36
Information (Metropolitan)	9.34	2.86	.61	.38
Reading Raw Score	39.79	9.60		

ARITHMETIC

Variable	Mean	S.D.	M.R.	R^2
Full IQ	105.53	15.15	.59	.35
Information (WISC)	9.80	3.20	.64	.41
Numbers (Metropolitan)	14.68	4.36	.67	.46
Socioeconomic Status	2.05	.74	.69	.48
Titles	26.33	13.58	.71	.51
Block Design (WISC)	11.35	2.87	.72	.52
Arithmetic Raw Score	62.67	7.20		

*Predictors Significant at or above the .05 level.

APPENDIX B

TABLE I

SOCIOMETRIC FORM *

The following questions are asked of each child individually in a place apart from the on-going kindergarten activities.

Name ______________________________________

Do you like kindergarten?

What do you like to do best while you are at school?

Who do you think is the happiest person in our room (the one who is always smiling)?

Is there anyone in our room who is a cry-baby? Who? (asked only if the answer is affirmative)

Is there anyone in our room who is too bossy - has to have "his own way"? Who?

Who is the kindest, friendliest, most helpful person in our room?

Is anyone in our room mean to the other children - a bully, picks on others? Who?

Is there anyone in our room who acts afraid of school? Who?

Who do you think is the very best worker in our kindergarten?

Let's pretend that you are going to have a party and you could ask the three people in our room that you like the very best. Which three boys and girls would you ask?

1. ______________________________
2. ______________________________
3. ______________________________

What do you like to do best when you are home?

*Keep record of number of self-choices to get self-concept.

APPENDIX B

TABLE II

KINDERGARTEN REGISTRATION

Information for school record Date ______________

Child's Name ________________________________ ______________
Last First Middle Any Nickname

National Background and Race ______________ Language spoken in home ________

Emergency Phone Number ________ ______________________________
Name of person being called by Emer. Phone

Child's Birth Place ______________ Birth Date: ______________________
Year Month Day

Evidence of Birth: Birth Cert. _______
Baptismal Cert. _______

Father's Name ________________ Step-father or Male Guardian ______________

Father's Home Address ______________ Phone ________ Occupation __________

Father works ______________ Phone ________ ________ to ________
Give name of Company Hours worked
and where it is located

Mother's Name ________________ Step-mother or Female Guardian __________

Home Address ________________ Phone _______ Work ________________
(Outside home-where)

Hours worked ______ to ______ Number of people living in the Home __________
Mother

Father ____ How many older brothers ____ How many younger brother ______
(Ages) ________ (Ages) ______

How many older Sister ______ Younger Sisters ______ List any others (grandmother, etc.)
(Ages) ______ (Ages) ______ ________________

Education of father, grade completed: ______ Grade completed by mother: ________

For Health Record:

DISEASE (Give dates when possible) Has child had any of the following diseases:

Measles _____ German Measles _____ Mumps _____ Whooping Cough _____ Scarlet Fever _____

Asthma _____ Hay Fever _____ Eczema _____ Any other diseases ______________

SMALL POX, Last vaccination date ________________

Diptheria, Whooping Cough, Tetanus, Last booster date ____________

Poliomyelitis (shots) last booster date ____________

Poliomyelitis (sugar cubes), dates Type I _____ Type II _____ Type III _____

TABLE II (Cont.)

Tuberculin Test: Positive ________Negative ________X-Ray__________

Does your child have any condition that would prevent him from entering into regular school activities?

Rheumatic fever_____Diabetes_____St. Vitus Dance_____Recent Surgery_____Epilepsy_____

Orthopedic Condition_____Heart Disease______Other_______

How many years of school are you planning for your child? Jr.High____High School____

Apprenticeship_____Vocational School______College______Graduate school______

Other______

Check Appropriate Blank:	OFTEN	OCCASIONALLY	NEVER
1. Child has been read to by parent-other	______	______	_____
2. Child watches TV	______	______	_____
3. Child has participated in organized group activities	______	______	_____
4. Child has traveled out of state	______	______	_____
5. Child joins in family conversation	______	______	_____
6. Child has been hospitalized	______	______	_____

State reasons (Tonsilectomy,hernia repair,etc.)_____________________________

Write many, few or none on the following blanks to indicate number of times:

1. Child has been to library____,zoo_____,farm_____,circus______, a big city______, museum______,airport______
2. Child has playmates older______,same age______,younger______
3. Child has run errands_________
4. Child has chores or jobs to help around the house___________

Please check appropriate blanks:

1. Child enjoys the following:

Outdoor Activities

Ball_________

Sandpile_________

Swings, Slides, etc._______

Riding cars, trikes________

Others_________

Indoor Activities

Games__________

Puzzles_________

Color Books________

Looking at books________

Cutting and pasting________

Toys____________

Dolls____________

Others____________

My child participated in a 1965 summer program:

School sponsored recreational______

Church sponsored recreational______

Project Head Start________________

76/77/78/79/80/81/82/83/84/85/86

APPENDIX B
Table III

Non-Verbal Form A, Minnesota Tests of Creative Thinking

The above mentioned test by Dr. E. Paul Torrance is copyrighted and available through the publisher, to those with level of test usage competency, outlined by the APA. A copy of the test may be obtained from: Personnel Press, Inc., 20 Nassau Street, Princeton, New Jersey 08540.

APPENDIX B

TABLE VI

CHEYENNE PUBLIC SCHOOLS

PHYSICAL SKILL TEST
for Primary Age Children

(1) Bend, Touch, and Twist (Dynamic Flexibility)

Equipment needed

Stop watch

x marked on floor and wall

Score- Number /20 sec.

Test Procedure: Subject stands with back to wall but far enough away so he won't touch it while bending over. Feet should be shoulder width apart. An X is marked on the floor between the feet and on the wall at shoulder height and center of the back. This may be done with tape or chalk.

On the signal "Go" the subject bends and touches the "X" between the feet with both hands, rises, twists and touches the "X" on the wall with both hands. This continues alternating side to which the subject twists each time.

The testor should demonstrate the movement at least three times, and the subject should be given opportunity to try the test to insure proper understanding of directions. Speed should be emphasized.

Score is the number of times the "X" on the wall is touched in 20 seconds.

Rope Jumping

Equipment needed

Stop watch

Jump rope (6 1/2 to 7 1/2 feet long)

Score- Number /20 sec. Best of two trials.

Test Procedure: Subject starts with rope behind him and turns rope over head passing it underneath both feet.

A stop watch is needed. Time and count start when rope first hits floor.

Emphasize that the rope must pass underneath to score, and if they miss to step over the rope into starting position.

Some beginners may only be able to step over the rope.

Score is number of times the rope passes underneath the subject in 20 seconds. The best of two trials is recorded.

(2) Standing Broad Jump

Equipment needed

Measuring tape

Take-off line

Score- Best of three trials.

Test Procedure: Area on floor is marked off in inches by placing tape measure or marking stick, or other method of your choice there. A take-off line is also needed. Student then jumps alongside marked area.

The students stands with his toes straight, not over the take-off line, feet spread apart. He jumps forward as far as possible by bending knee and swinging arms to start the jump. However, if the student falls backward the jump is not scored.

Three attempts are given, including falls. In rare cases where the student makes all three jumps incorrectly another try is given.

Measurements are taken from the take off line to the back of the nearest heel at impact. Score is the best jump of three, to the nearest inch.

(3) Balance

Equipment needed
- Balance rail
- Stop watch

Score- Total of two trials

Test Procedure: A balance rail 2 feet long, 3/4 inch wide, and top 2 1/2" off the floor is needed. A stop watch is also necessary.

Student is told to place one foot on the rail (preferred foot) and hand on hips. He then says "Go" as he raises other foot from floor, and holds balance as long as possible.

After a practice trial, procedure is repeated. Two separate trials are then allowed.

Any time the other foot touches the floor or rail the trial is stopped. If the subject reaches 20 seconds he is told to stop for that trial and receives a score of "20" for that trial.

Total time for two trials is recorded as the score.

Ball Bounce

Equipment needed
- Jr. size basketball
- Stop watch
- 27" square on floor

Score- Number /20 sec.

Test Procedure: a 27 inch square is marked off on the floor.

Student bounces ball as many times as possible in 20 seconds. If ball goes out of square it must be brought back and bouncing continues.

Start the time and count as the ball first hits the floor.

Score is number of bounces in square during 20 sec.

Adapted from Fleishman, Edwin A. The Structure and Measurement of Physical Fitness. Prentice Hall, Inc. 1964, pp. 162-3.

APPENDIX C

TABLE I

WISC SUBTEST MEAN SCORES

			SEX			
SUBTESTS	Total Group N=300		Male N=153		Female N=147	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Information	9.5	3.2	9.5	3.1	9.4	3.3
Comprehension	10.9	4.0	11.5	3.8	10.2	4.1
Arithmetic	9.8	2.7	9.5	2.7	10.1	2.6
Similarities	10.7	3.8	10.9	3.9	10.5	3.7
Vocabulary	11.6	3.3	11.8	3.0	11.5	3.5
Digit Span	10.0	3.3	9.5	3.1	10.6	3.3
Picture Completion	10.0	2.5	10.1	2.6	10.0	2.4
Picture Assembly	10.7	3.3	11.0	3.1	10.5	3.5
Block Design	11.1	2.9	11.0	3.1	11.2	2.6
Object Assembly	12.0	3.3	12.2	3.2	11.8	3.4
Coding	10.7	3.0	10.0	2.6	11.4	3.2
Maze	10.1	3.4	10.8	3.3	9.3	3.5

APPENDIX C

TABLE II

WISC SUBTEST MEAN SCORES

			SOCIOECONOMIC STATUS			
SUBTESTS	Lower N=75		Middle N=149		Upper N=76	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Information	8.3	2.8	10.1	3.2	9.3	3.3
Comprehension	10.5	3.8	11.1	4.3	10.9	3.7
Arithmetic	9.0	3.0	9.9	2.7	10.4	2.3
Similarities	10.2	3.7	10.8	3.8	11.1	4.1
Vocabulary	9.4	2.9	12.4	3.1	12.3	2.9
Digit Span	8.7	3.1	10.4	3.3	11.0	2.9
Picture Completion	9.5	2.6	10.0	2.5	10.6	2.7
Picture Assembly	9.7	3.5	11.1	3.2	11.1	3.0
Block Design	10.0	3.0	11.5	2.8	11.4	2.7
Object Assembly	11.0	3.3	12.5	3.4	12.0	3.0
Coding	9.9	3.0	11.0	3.0	10.8	2.8
Maze	8.7	2.8	10.9	3.6	9.7	3.2

APPENDIX C

TABLE III

WISC SUBTEST MEAN SCORES

	AGE (IN MONTHS)					
	60-64 N=97		65-69 N=117		70-79 N=86	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Information	9.8	3.2	9.2	2.9	9.4	3.5
Comprehension	11.0	4.1	11.0	3.9	10.7	4.2
Arithmetic	9.8	3.1	9.9	2.5	9.6	2.5
Similarities	10.5	3.8	10.8	3.9	10.8	3.8
Vocabulary	11.9	3.4	11.4	2.9	11.6	3.6
Digit Span	10.4	3.4	9.9	3.1	9.7	3.3
Picture Completion	10.2	2.6	9.9	2.9	9.9	2.5
Picture Arrangement	11.3	3.3	10.6	3.2	10.3	3.3
Block Design	11.3	3.0	11.0	2.7	11.0	3.0
Object Assembly	12.1	3.4	11.9	3.2	12.0	3.4
Coding	10.8	3.1	11.2	3.1	9.9	2.4
Maze	9.7	3.7	10.1	3.5	10.4	3.0

APPENDIX C

TABLE IV

METROPOLITAN ACHIEVEMENT TEST BY SOCIOECONOMIC LEVEL

First Grade (Percentile Scores)

	READING			ARITHMETIC	
Group	N	Mean	S.D.	Mean	S.D.
Total	226	64.3	27.4	73.9	23.2
Lower	55	51.6	23.7	69.5	25.1
Middle	111	66.9	27.9	74.3	23.8
Upper	60	70.9	26.1	77.1	19.8

TABLE IV (Cont.)

Second Grade (Raw Scores)

	READING			ARITHMETIC	
Group	N	Mean	S.D.	Mean	S.D.
Total	188	39.79	9.60	63.03	5.55
Lower	43	31.59	10.98	60.33	5.91
Middle	90	41.78	7.92	63.31	5.05
Upper	55	42.93	7.15	64.67	5.36

APPENDIX C

TABLE V

SOCIOECONOMIC DIFFERENCES BETWEEN LOWER AND MIDDLE AND MIDDLE AND UPPER GROUPS AT THE SECOND GRADE LEVEL (SIGNIFICANT AT .05 LEVEL OR HIGHER)

	Mean Performance Lower S.E. Group less than Mean Performance Middle S.E.Group (Lower S.E. vs. Middle S.E.)	Mean Performance Upper S.E. Group less than Mean Performance Middle S.E. Group (Upper S.E. vs. Middle S.E.)
VARIABLE	LEVEL OF SIGNIFICANCE	
WISC scores		
Information	.05	
Digit Span	.01	
Block Design	.05	
Verbal IQ	.001	
Performance IQ	.001	Perf. IQ .05
Full IQ	.001	
METROPOLITAN READINESS		
Information	.05	Matching ----- .05
TEACHERS' RATINGS		
Way Peers See	.05	Way Peers See--.001
Leadership	.001	
Social-Emotional Growth	.001	S.E. Growth----.001
Prediction Reading Success	.001	

TABLE V (Cont.)

VARIABLE	LEVEL OF SIGNIFICANCE	
CREATIVITY		
Titles	.001	
EDUCATION OF MOTHER	.001	
SOCIOMETRIC		
Seen in Positive Role	.01	
GESELL DEVELOPMENTAL		
Complete-A-Man	.001	
Commands	.001	
Visual 3	.01	Visual 3 ------ .05
PHYSICAL SKILLS		
Bend, Touch, Twist	.01	
ACHIEVEMENT TESTS		
Reading First Grade	.001	
Reading Second Grade	.001	
Arithmetic Second Grade	.05	

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TABLE VI

FIRST GRADE DIFFERENCES BETWEEN 114 MALES AND 112 FEMALES SHOWING POSITIVE DIFFERENCES FAVORING FEMALES SIGNIFICANT AT .05 LEVEL OR HIGHER

VARIABEL	LEVEL OF SIGNIFICANCE
WISC score	
Digit Span	.01
METROPOLITAN READINESS	
Matching	.05
Draw-A-Man	.01

TABLE VI (Cont.)

VARIABLE	LEVEL OF SIGNIFICANCE
TEACHER RATINGS	
Needs Teacher Control	.001
Social-Emotional Growth	.01
Prediction of Reading Success	.05
ACHIEVEMENT scores	
First Grade Reading	.001
Second Grade Reading	.05
First Grade Arithmetic	.05

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TABLE VII

METROPOLITAN READINESS SUBTEST SCORES
(RAW SCORE UNITS)

METROPOLITAN SUBTEST	TOTAL Group N=294		SEX Male N=150		SEX Female N=144	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Word Meaning	9.9	3.0	10.1	2.7	9.6	3.2
Sentence	10.5	2.4	10.4	2.4	10.7	2.4
Information	8.9	3.3	8.5	3.1	9.4	3.0
Matching	11.36	4.1	10.7	4.0	12.1	4.1
Total Above	40.7	9.4	39.6	9.1	41.8	9.7
Numbers	14.0	4.5	13.3	4.3	14.7	4.5
Copying	7.7	3.3	7.6	3.5	7.9	3.0
Total all of above	62.5	14.7	60.5	14.4	64.6	14.7
Reading Readiness	40.6	9.5	39.6	9.1	41.7	9.8
Number Readiness	14.3	6.5	13.3	4.3	15.4	8.0
Total Readiness	62.4	14.8	60.5	14.4	64.5	14.9

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TABLE VIII

METROPOLITAN READINESS SUBTEST SCORES
(RAW SCORE UNITS)

METROPOLITAN SUBTEST	AGE IN MONTHS					
	60-64 N=91		65-69 N=117		70-79 N=86	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Word Meaning	9.6	3.0	9.7	3.0	10.5	2.8
Sentence	10.3	2.5	10.6	2.4	10.6	2.3
Information	8.5	3.3	9.0	3.3	9.3	2.7
Matching	10.4	4.5	11.7	4.1	12.0	3.5
Total Above	38.8	10.1	40.9	9.9	43.3	7.7
Numbers	12.9	4.8	14.3	4.7	14.9	3.6
Copying	6.8	3.3	7.8	3.4	8.7	2.8
Total all of above	58.5	16.1	63.0	15.3	65.9	10.9
Reading Readiness	38.7	10.3	40.9	9.9	42.3	7.7
Number Readiness	13.0	4.8	14.3	4.7	14.9	3.6
Total Readiness	58.3	16.3	63.0	15.3	65.9	10.9

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TABLE IX

METROPOLITAN READINESS SUBTEST SCORES
(RAW SCORE UNITS)

METROPOLITAN SUBTEST	SOCIOECONOMIC GROUP					
	Lower N=74		Middle N=147		Upper N=73	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Word Meaning	8.1	2.8	10.6	2.9	10.2	2.6
Sentence	9.5	2.3	10.8	2.5	11.0	2.1
Information	8.0	2.8	9.0	3.4	9.6	2.7
Matching	11.1	4.1	10.9	4.2	12.7	3.6
Total Above	36.8	8.2	41.2	10.1	43.5	7.9
Numbers	12.9	4.2	14.3	4.5	14.6	4.7
Copying	7.0	3.3	8.1	3.3	7.6	3.1
Total all of above	56.8	13.2	63.7	15.3	65.7	13.4
Reading Readiness	36.7	8.4	41.2	10.1	43.4	7.9
Number Readiness	13.0	4.1	14.3	4.5	14.6	4.7
Total Readiness	56.7	13.5	63.7	15.3	65.7	13.4

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TABLE X

ZERO ORDER CORRELATIONS BETWEEN FIRST GRADE ACHIEVEMENT AND TEACHERS' ESTIMATE OF PUPIL PROGRESS IN READING
(N = 226)

READING ACHIEVEMENT

Reading Prediction	.633
Multi-Sensory	.595
Auditory Perception	.586
Visual Perception	.585
Thinking	.561
Speech	.483
Motor	.469

ARITHMETIC ACHIEVEMENT
(N = 226)

Reading Prediction	.574
Multi-Sensory	.503
Thinking	.496
Visual Perception	.487
Auditory Perception	.481
Motor Ability	.419
Speech	.409

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TABLE XI

ZERO ORDER CORRELATIONS BETWEEN FIRST GRADE ACHIEVEMENT AND THE TEACHERS' RATING OF SOCIAL-EMOTIONAL GROWTH

READING ACHIEVEMENT
(N = 226)

Social-Emotional	.477
Total Score	.456
Leadership	.433
Security	.421
Affects Group	.390

ARITHMETIC ACHIEVEMENT
(N = 226)

Social-Emotional Growth	.479
Total Score	.430
Leadership	.421
Security	.411
Popularity	.380

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TABLE XII

CORRELATIONS BETWEEN SUBTESTS ON TWO TEACHER RATING SCALES: ESTIMATE OF PUPIL PROGRESS AND SOCIAL - EMOTION MATURITY*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. Auditory Perception																			
2. Speech	75																		
3. Visual	84	73																	
4. Motor Ability	68	62	75																
5. Multi-Sensory	89	75	82	72															
6. Thinking	80	77	79	71	85														
7. Reading Prediction	82	72	79	66	85	81													
8. Group Activities	41	41	39	39	44	43	45												
9. Playground Activities	31	34	27	30	37	38	32	78											
10. Effects Group	52	51	51	53	53	53	56	56	48										
11. Children Toward Him	35	42	37	35	39	41	44	49	40	69									
12. Secure	50	57	49	46	51	55	55	61	53	74	73								
13. Leadership	55	55	50	42	55	58	60	53	53	56	52	69							
14. Expressive Behavior	45	49	43	43	47	46	54	43	33	57	49	66	44						
15. Needs Teachers'Control	13	13	20	21	13	08	17	12	-02	33	19	17	-13	31					
16. Expresses Affection	21	33	19	24	24	30	33	35	21	60	67	57	34	45	30				
17. Social-Emotion Growth	59	58	58	58	58	61	68	53	41	73	67	72	61	66	30	54			
18. Total Score	55	60	54	55	58	60	64	73	62	85	80	87	69	74	40	69	85		
19. Popularity Scale	46	52	46	43	48	52	56	56	45	67	80	76	63	54	19	65	74	82	

* Decimals Omitted

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TABLE XIII

SOCIOMETRIC SCORES BY SELECTED SUB-POPULATIONS

	TOTAL N=292		MALES N=148		FEMALES N=144	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
# of times identified as cry baby	1.7	3.5	2.5	3.9	.9	2.8
# of times identified as happiest	2.1	2.5	1.8	1.8	2.4	3.0
Seen in a positive role	9.1	10.6	8.0	8.0	10.2	12.8
Seen in a negative role	7.7	18.6	11.4	23.3	3.9	10.7
Chosen as one of 3 best liked	2.5	1.9	2.3	1.8	2.6	2.1
Rank order # times chosen	4.6	1.9	4.6	2.0	4.6	1.9
Age in months	66.8	3.8	66.8	3.8	66.7	3.8

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TABLE XIV

SOCIOMETRIC SCORES BY SELECTED SUB-POPULATIONS

AGE (IN MONTHS)

	60-64 N=94		65-69 N=113		70-79 N=85	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
# of times identified as cry baby	2.0	4.2	1.5	2.4	1.7	3.8
# of times identified as happiest	1.4	1.3	2.5	2.3	2.3	3.4
Seen in a positive role	6.4	6.5	11.4	11.6	9.1	12.3
Seen in a negative role	8.4	16.6	5.9	9.4	9.1	27.7
Chosen as one of 3 best liked	1.9	1.5	2.7	1.9	2.7	2.2
Rank order # times chosen	5.1	1.9	4.4	1.9	4.3	2.0

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TABLE XV

SOCIOMETRIC LEVELS

	Lower Socioeconomic		Middle Socioeconomic		Upper Socioeconomic	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
# times identified as cry baby	1.7	2.4	1.8	3.5	1.6	4.3
# times identified as Happiest	2.1	3.3	2.1	1.9	2.2	2.6
Seen in a positive role	7.0	10.9	9.0	8.2	11.3	13.9
Seen in a negative role	5.9	8.3	7.8	14.3	9.3	30.3
Chosen as one of 3 best liked	2.3	2.1	2.6	1.9	2.4	1.9
Rank order # times chosen	5.2	2.0	4.6	2.0	4.1	1.5
Age in months	67.7	4.2	66.4	3.7	66.5	3.4

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TABLE XVI

GESELL DEVELOPMENTAL DATA

			SEX			
VARIABLE	TOTAL N=226		MALES N=114		FEMALES N=112	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Response Activity	2.10	.75	1.97	.81	2.17	.68
Printed Name	1.19	.40	1.25	.43	1.17	.37
Knew Birth Date	1.58	.49	1.65	.48	1.53	.50
Knew Numbers	1.56	1.02	1.68	1.09	1.45	.96
Complete-A-Man*	8.07	1.01	7.91	1.08	8.14	.97
Circle	1.47	.95	1.60	1.03	1.36	.85
Commands	8.21	3.44	9.05	4.04	7.74	3.57
Visual 1*	11.49	1.03	11.37	1.11	11.54	1.07
Visual 3*	6.44	2.02	6.10	2.05	6.62	2.01
Projections	2.65	1.04	2.87	1.09	2.45	.88
Animals Named*	9.33	2.60	9.52	2.64	8.91	2.38
Placement	2.05	.86	2.19	.79	1.98	.87
Teeth Losses	3.86	2.52	3.52	2.54	4.11	2.51
Handedness (1 right, 2 left)	1.08	.27	1.10	.30	1.06	.24

*Higher number has higher positive value.

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TABLE XVII

GESELL DEVELOPMENTAL DATA

	SOCIOECONOMIC STATUS					
VARIABLE	LOWER N=55		MIDDLE N=111		UPPER N=60	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Response Activity	2.12	.88	2.02	.72	2.11	.67
Printed Name	1.25	.44	1.19	.39	1.21	.41
Knew Birth Date	1.75	.44	1.59	.49	1.43	.50
Knew Numbers	1.72	1.20	1.47	.93	1.63	1.04
Complete-A-Man*	7.52	1.15	8.22	.96	8.17	.85
Circle	1.40	.94	1.49	.92	1.51	.98
Commands	9.84	5.02	7.99	3.17	7.63	3.37
Visual 1*	11.04	1.40	11.71	.84	11.40	1.04
Visual 3*	5.81	1.94	6.75	1.98	6.22	2.15
Projections	2.70	1.13	2.58	.97	2.75	.98
Animals Named*	8.25	2.10	9.25	2.56	10.19	2.55
Placement	2.37	.74	2.03	.92	1.87	.69
Teeth Losses	4.09	2.66	3.81	2.42	3.54	2.65
Handedness (1 right, 2 left)	1.04	.21	1.09	.28	1.11	.32

*Higher number has higher positive value.

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TABLE XVIII

GESELL DEVELOPMENTAL DATA

	AGE (IN MONTHS)					
VARIABLE	69-79 N=79		80-83 N=88		84-95 N=92	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Response Activity	2.15	.79	2.08	.73	1.98	.74
Printed Name	1.27	.44	1.22	.41	1.15	.36
Knew Birth Date	1.62	.49	1.58	.50	1.58	.50
Knew Numbers	1.84	1.20	1.55	1.02	1.37	.83
Complete-A-Man*	7.90	1.10	8.14	.95	8.04	1.04
Circle	1.54	1.01	1.39	.88	1.49	.93
Commands	8.22	3.70	8.17	3.87	8.21	4.00
Visual 1*	11.48	1.18	11.32	1.23	11.59	.84
Visual 3*	5.90	2.04	6.42	2.02	6.75	2.01
Projections	2.70	.97	2.64	.97	2.63	1.10
Animals Named*	8.65	2.28	8.99	2.72	9.93	2.41
Placement	2.20	.69	2.03	.71	2.02	1.05
Teeth Losses	2.63	2.24	3.80	2.53	4.85	2.36
Handedness (1 right, 2 left)	1.09	.26	1.06	.23	1.10	.30

* Higher number has higher positive value.

APPENDIX C

TABLE XIX

CORRELATIONS AMONG IQ TESTS, CREATIVITY TESTS, AND READING ACHIEVEMENT TESTS OF TOTAL GROUP

	Titles	Digit Span	Arithmetic	Verbal IQ	Performance IQ	Full Scale IQ	First Grade Reading (N=226)	Second Grade Reading (N=188)
1. Titles		35	11	24	22	39	24	34
2. Digit Span			37	57	39	61	52	37
3. Arithmetic				50	34	60	42	27
4. Verbal IQ					63	90	41	37
5. Performance IQ						87	37	37
6. Full Scale IQ							45	41

Note: Decimals Omitted

APPENDIX C

TABLE XX

CORRELATIONS AMONG IQ TESTS, CREATIVITY TESTS AND READING ACHIEVEMENT OF MALES

	Titles	Digit Span	Arithmetic	Verbal IQ	Performance IQ	Full Scale IQ	First Grade Reading (N=114)	Second Grade Reading (N=91)
1. Titles		29	08	28	33	35	26	43
2. Digit Span			28	61	46	63	48	30
3. Arithmetic				47	25	43	42	18
4. Verbal IQ					44	87	42	24
5. Performance IQ						83	48	32
6. Full Scale IQ							51	32

Note: Decimals Omitted

APPENDIX C

TABLE XXI

CORRELATIONS AMONG IQ TESTS, CREATIVITY TESTS, AND READING ACHIEVEMENT OF FEMALES

	Titles	Digit Span	Arithmetic	Verbal IQ	Performance IQ	Full Scale IQ	First Grade Reading (N=112)	Second Grade Reading (N=97)
1. Titles		43	15	41	33	42	26	27
2. Digit Span			42	65	41	61	50	38
3. Arithmetic				67	53	68	37	36
4. Verbal IQ					57	90	46	40
5. Performance IQ						87	40	34
6. Full Scale IQ								42

Note: Decimals Omitted

APPENDIX C

TABLE XXII

CORRELATIONS AMONG IQ TESTS, CREATIVITY TESTS, AND READING ACHIEVEMENT OF LOWER SOCIOECONOMIC GROUP

	Titles	Digit Span	Arithmetic	Verbal IQ	Performance IQ	Full Scale IQ	First Grade Reading (N=55)	Second Grade Reading (N=43)
1. Titles		16	29	30	25	31	24	14
2. Digit Span			50	55	24	46	44	09
3. Arithmetic				57	49	61	40	30
4. Verbal IQ					49	87	43	22
5. Performance IQ						87	35	16
6. Full Scale IQ							44	21

Note: Decimals Omitted

APPENDIX C

TABLE XXIII

CORRELATIONS AMONG IQ TESTS, CREATIVITY TESTS, AND READING ACHIEVEMENT OF MIDDLE SOCIOECONOMIC GROUP

	Titles	Digit Span	Arithmetic	Verbal IQ	Performance IQ	Full Scale IQ	First Grade Reading (N=111)	Second Grade Reading (N=90)
1. Titles		29	23	26	28	31	12	10
2. Digit Span			30	61	39	58	45	30
3. Arithmetic				56	34	52	40	18
4. Verbal IQ					50	88	39	15
5. Performance IQ						86	59	18
6. Full Scale IQ							44	19

Note: Decimals Omitted

APPENDIX C

TABLE XXIV

CORRELATIONS AMONG IQ TESTS, CREATIVITY TESTS, AND READING ACHIEVEMENT OF UPPER SOCIOECONOMIC GROUP

	Titles	Digit Span	Arithmetic	Verbal IQ	Performance IQ	Full Scale IQ	First Grade Reading (N=60)	Second Grade Reading (N=55)
1. Titles		29	-03	31	08	26	07	16
2. Digit Span			32	59	45	62	57	53
3. Arithmetic				62	46	64	40	36
4. Verbal IQ					45	91	37	43
5. Performance IQ						78	44	38
6. Full Scale IQ							46	48

Note: Decimals Omitted

APPENDIX D

TABLE I

RESULTS OF FROSTIG DEVELOPMENTAL TEST OF VISUAL PERCEPTION AND ILLINOIS TEST OF PHYCHOLINGUISTIC ABILITIES

Fifty pupils in the three year longitudinal study group were administered the Frostig Developmental Test of Visual Perception and the Illinois Test of Psycholinguistic Abilities as part of a doctoral study.[1] Of these pupils, 42 remained in the study throughout the entire period and all data were complete. Tests of significance were computed to determine if this group of 42 was significantly different on the predictor variables from the final 188 pupil group. Table II reports the results and shows the groups were not significantly different.

Findings on the Developmental Test of Visual Perception and the Illinois Test of Psycholinguistic Abilities

Subtest scores on the DTVP and the ITPA are shown in Tables III and IV with zero order correlations with first grade achievement scores.

Two subtests of the DTVP were significant at the .05 level in predicting first grade reading achievement scores and two were significant for predicting first grade arithmetic achievement when the regression analysis was completed. (See Tables V and VI).

From the DTVP variables Figure Ground and Position in Space were combined with the significant varibles from the other measures to compute the regression analysis using the second grade achievement scores as the dependent variables.

From the ITPA the two variables auditory-vocal association and auditory-vocal automatic were added to the second grade regression analysis.

None of the DTVP predictor variables emerged as significant at the .05 level in the second grade analysis for either reading or arithmetic achievement.

None of the ITPA predictor variables survived as significant at the .05 level in the second grade analysis for arithmetic.

The auditory-vocal association subtest entered first in the regression analysis for prediction of second grade reading achievement. The correlation between auditory-vocal association and second grade reading achievement was .673. Sex was the only other variable significant at the .05 level. The multiple correlation with sex added was .730.

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[1] Hueftle, M. Keene, A Factor Analytic Study of the Frostig Developmental Test of Visual Perception, the Illinois Test of Psycholinguistic Abilities, and the Wechsler Intelligence Scale for Children. A Doctoral Dissertation, Colorado State College, Greeley, Colorado, Spring, 1967.

Summary of Findings with the Developmental Test of Visual Perception and the Illinois Test of Psycholinguistic Abilities

1. The DTVP variables when combined with significant second variables from other evaluative measures did not emerge as significant second grade reading or arithmetic achievement variables.

2. One subtest, auditory-vocal association, emerged as the first predictor for second grade reading achievement. None of the ITPA variables emerged as significant predictor variables for second grade arithmetic achievement.

3. The correlation of the auditory-vocal association subtest and second grade reading achievement should be carefully considered and replicated. This was the highest correlation found for any of the measures with second grade reading achievement.

APPENDIX D

TABLE II

STATISTICAL DIFFERENCES BETWEEN THE 42 WHO HAD THE DTVP AND THE ITPA AND THE 188 CONCLUDING THE STUDY

WISC TESTS	42 DTVP & ITPA and 188 Entire Group
Information	N.S.
Arithmetic	.05 level
Digit Span	N.S.
Block Design	N.S.
Verbal IQ	N.S.
Performance IQ	N.S.
Full IQ	N.S.
METROPOLITAN TESTS	
Matching	N.S.
Numbers	N.S.
Draw-A-Man	N.S.

TABLE II (Cont.)

	42 DTVP & ITPA and 188 Entire Group
TEACHER RATING SCALES	
Prediction of Reading	N.S.
CREATIVITY TESTS	
Titles	N.S.
SOCIOECONOMIC STATUS	N.S.
SEX	N.S.
EDUCATION OF THE MOTHER	N.S.
GESELL DEVELOPMENTAL	
Numbers	N.S.
Complete-A-Man	N.S.
Visual 3	N.S.

APPENDIX D

TABLE III

DTVP MEAN, S. D., AND ZERO ORDER CORRELATIONS WITH FIRST GRADE READING AND ARITHMETIC ACHIEVEMENT SCORES

(N = 50)

	Mean	S.D.	R with Reading	R with Arithmetic
Eye-Motor Coordination	16.1	3.3	.18	.33
Figure Ground	17.9	2.2	.31	.45
Form Constancy	9.6	3.4	.14	.27
Position in Space	6.9	1.0	.44	.32
Spatial Relations	6.1	1.0	.25	.26
Reading Percentile	66.3	25.1		
Arithmetic Percentile	67.2	24.2		

APPENDIX D

TABLE IV

ITPA MEAN, S. D., AND ZERO ORDER CORRELATIONS WITH FIRST GRADE READING AND ARITHMETIC ACHIEVEMENT SCORES

	Mean	S.D.	R with Reading	R with Arithmetic
Auditory-Vocal Automatic	15.3	3.3	.39	.59
Visual Decoding	15.4	2.4	.42	.27
Motor Encoding	17.4	3.6	.20	.21
Auditory-Vocal Association	19.2	2.7	.71	.66
Visual-Motor Sequencing	14.6	4.1	.49	.36
Vocal Encoding	19.2	5.3	.19	.01
Auditory-Vocal Sequencing	21.0	5.4	.33	.19
Visual Motor Association	19.8	2.4	.33	.30
Auditory Decoding	27.8	3.9	.10	.08
Reading Percentile	65.6	24.8		
Arithmetic Percentile	68.5	23.7		

APPENDIX D

TABLE V

DTVP PREDICTOR VARIABLES FOR FIRST GRADE ACHIEVEMENT SCORES SIGNIFICANT AT .05 LEVEL

(N = 42)

FIRST GRADE READING ACHIEVEMENT

Variable	Mean	S.D.	M.R.	R^2
Figure Ground	16.4	3.1	.450	.20

FIRST GRADE ARITHMETIC ACHIEVEMENT

Variable	Mean	S.D.	M.R.	R^2
Figure Ground	16.4	3.1	.474	.22
Position in Space	2.0	.6	.531	.28

APPENDIX D

TABLE VI

ITPA PREDICTOR VARIABLES FOR FIRST GRADE ACHIEVEMENT SCORES SIGNIFICANT AT .05 LEVEL

(N = 42)

FIRST GRADE READING ACHIEVEMENT

Variable	Mean	S.D.	M.R.	R^2
Auditory-Vocal Association	15.3	3.4	.7088	.50

FIRST GRADE ARITHMETIC ACHIEVEMENT

Variable	Mean	S.D.	M.R.	R^2
Auditory-Vocal Association	15.3	3.4	.663	.44
Auditory-Vocal Automatic	10.8	1.6	.710	.50